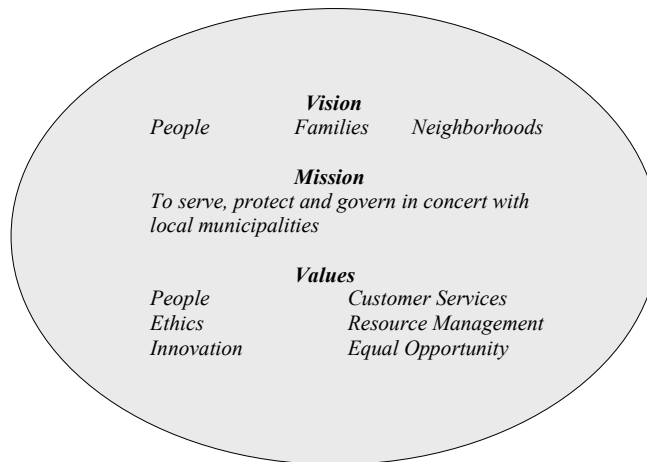




FULTON COUNTY



**PURCHASING DEPARTMENT
REQUEST FOR INVITATION TO BID NO. 07ITB54597K-DB**

W035- CONSTRUCTION SERVICES FOR RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT

For

DEPARTMENT OF PUBLIC WORKS

**BID DUE TIME AND DATE: 11:00 A.M. March 12, 2007
PURCHASING CONTACT: Darlene Banks at (404) 730-7879
E-MAIL: Darlene.Banks@fultoncountyga.gov**

**LOCATION: FULTON COUNTY PURCHASING DEPARTMENT
130 PEACHTREE STREET, S.W., SUITE 1168
ATLANTA, GA 30303**

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INVITATION TO BID**W035- RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT****Purpose:**

The purpose of this Project is to replace existing, older asbestos-cement water mains along Riverside Road and Dogwood Road with ductile iron pipe (DIP). The new water main will continue to serve residences and commercial areas along Riverside-Dogwood Roads in Roswell, and is intended to improve reliability of the water supply these areas.

Description of Project:

The Project consists of replacing existing water mains with approximately 16,500 linear feet of DIP ranging from 8 inches to 24 inches in diameter. The new main will connect to the existing Fulton County 42 inch water main located along Old Holcomb Bridge Road. An additional connection will be made to the City of Atlanta's water system to allow for a standby water supply in case of a system failure.

The project also consists of replacement of branches along the following subdivision streets: Indian Springs Drive, Riviera Drive, River Lake Drive, and River Lake Court.

Scope of Work Summary:

The Work to be performed under this Contract shall consist of furnishing all labor, materials, tools, equipment and incidentals and performing all Work required to construct complete in place and ready to perform the following:

1. Install approximately 16,500 linear feet of ductile iron pipe (DIP) water main as shown in the project drawings and as specified in the project specifications and details. Diameters will vary from 8 inches to 24 inches.
2. Install 16 inch diameter flow meter, SCADA system, and concrete enclosure vault, and all accessories.
3. Reconnect residential and commercial service lines to new water mains.
4. Add or remove and replace fire hydrants as indicated in the project drawings.
5. Install all valve assemblies and connections to existing lines where indicated.
6. Replace roadway surfaces, curb and gutter, sidewalks, roadway structures and driveways. Restore all disturbed ground surfaces.
7. If necessary, prepare and submit traffic control plans to the County's Construction Manager.
8. Install sedimentation and erosion control items as necessary. Remove after control of sediment and erosion runoff has been established.
9. Make provisions for central construction worksite field office and storage area.
10. Perform all duties necessary for construction cleanup and project close out.
11. Assist County and County's Design Engineer in the production of record as-built drawings.

12. Locate all underground utilities prior to excavation activities.
13. Provide services for testing of soil, and asphalt and cementitious concrete as required.
14. Provide construction surveying as necessary.
15. Contractor shall submit a project schedule including milestones for the substantial completion of work and the final completion of work.

All Work described above shall be performed as shown on the Drawings and as specified herein.

Purchasing the Bid Document

This document and supporting documents can be downloaded at the Fulton County Website, <http://www.fultoncountyga.gov> under "Bid Opportunities".

Applications for documents, along with a non-refundable \$50.00 payment must be made to Fulton Construction Management Partners, 141 Pryor Street, S.W., Suite 6001, Atlanta, Georgia 30303. Payment must be in the form of a company or personal check payable to Fulton Construction Management Partners. Checks returned for any reason will result in the proposal being deemed non-responsive. This amount includes all fees for printing and distribution and will be used to defray a portion of the printing cost that may have been incurred for the tendering of the Project. Partial sets of the bid document will not be issued.

For payment information, contact Pamela Cody, Fulton CMP at (404) 893-0880. All other questions should be addressed by the procedures outlined in this ITB to Purchasing, Fulton County Department of Purchasing and Contract Compliance at 404-730-7879, Darlene.Banks@fultoncountyga.gov.

McGraw Hill Construction Dodge
3200 Riverside Dr
STE 310
Macon, Georgia 31210

Fulton County Department of Public Works
STE 6001
141 Pryor ST, S.W., 6th Floor
Atlanta, Georgia 30303

AGC Builders Exchange
1940 The Exchange
STE 300
Atlanta, Georgia 30339

CMD / Construction Market Data
30 Technology Blvd
STE 100
Norcross Georgia 30092

FW Dodge Corporation
4170 Ashford-Dunwoody Rd
STE 200
Atlanta, Georgia 30319

Minority Business Development Agency
401 West Peachtree St
Summit Bldg STE 1715
Atlanta Georgia 30308

Term of Contract:

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within **365** consecutive calendar days from and including said date.

The County will make payments, within **45** days, in response to the Contractor's monthly Applications for Payment, which are accompanied by the Engineer's Certificate for Payment, for work performed to date plus cost of stored materials, less retainage. Payments, Applications for Payment, Certificates for Payment, and retainage shall be in accordance with the provisions of the Contract Documents.

No Contact Provision

It is the policy of Fulton County that the evaluation and award process for County contracts shall be free from both actual and perceived impropriety, and that contacts between potential vendors and County officials, elected officials and staff regarding pending awards of County contracts shall be prohibited.

- A. No person, firm, or business entity, however situated or composed, obtaining a copy of or responding to this solicitation, shall initiate or continue any verbal or written communication regarding this solicitation with any County officer, elected official, employee, or designated County representative, between the date of the issuance of this solicitation and the date of the County Manager's recommendation to the Board of Commissioners for award of the subject contract, except as may otherwise be specifically authorized and permitted by the terms and conditions of this solicitation.
- B. All verbal and written communications initiated by such person, firm, or entity regarding this solicitation, if same are authorized and permitted by the terms and conditions of this solicitation, shall be directed to the Purchasing Agent.
- C. Any violation of this prohibition of the initiation or continuation of verbal or written communications with County officers, elected officials, employees, or designated County representatives shall result in a written finding by the Purchasing Agent that the submitted Bid or proposal of the person, firm, or entity in violation is "non-responsive", and same shall not be considered for award.

Bid Contact

Information regarding the bid, either procedural or technical, may be obtained by contacting Darlene A. Banks, Darlene.Banks@fultoncountyga.gov, Assistant Purchasing Agent at (404) 730-7879, Fulton County Department of Purchasing. Information regarding the bid requirements may be obtained by using the following procedure. Inquiries must be submitted in writing to;

Fulton County Department of Purchasing and Contract Compliance
Attn: Darlene A. Banks
130 Peachtree Street, S.W. Suite 1168
Atlanta, GA 30303
Phone: (404) 730-7879
Fax: (404) 893-1745
Reference Bid # 07ITB54597K-DB

Basis of Award

The Contract, if awarded, will be awarded to the lowest responsive and responsible bidder. No bid may be withdrawn for a period of sixty (60) days after the date of bid opening except as permitted by O.C.G.A., §36-91-41 et seq., as amended. Each Bid must be accompanied by a Bid Bond in accordance with the Bid Bond Requirements provided in the Contract Documents, on a Surety Company's Standard Bid Bond Form acceptable to the County in an amount no less than 5% of the amount bid. The successful bidder will be required to furnish a Performance Bond and Payment Bond, **on or before** the issuance of Notice to Proceed, each in the amount of 100% of the Contract Amount. All other required Contract Documents must be fully completed and executed by the Contractor and his/her Surety, and submitted to the Owner **on or before** the issuance of the Notice to Proceed.

Pre-Bid Conference

Date: February 26, 2007
Time: 9:30 a.m.

Location: Fulton County Department of Purchasing and Contract Compliance, Public Safety Building
130 Peachtree Street, S.W. Suite 1168
Atlanta, GA 30303

A pre-bid conference will be held in the Fulton County Department of Purchasing and Contract Compliance Conference Room, located at 130 Peachtree Street, S.W. Suite 1168, Atlanta, Georgia 30303. ***Inquiries regarding the solicitation either technical or otherwise may be submitted in writing prior to the pre-bid conference and will be addressed at the pre-bid conference.*** Any additional questions asked at the pre-bid conference must be submitted in written form at the pre-bid conference and will be responded to in the form of an addendum with the County's official responses.

The Pre-bid conference will be conducted for the purpose of explaining the County's bid process, the specifications/technical documents, and to provide and initial verbal, non-binding verbal response to questions concerning these bid specifications and to discuss issues from the bidders perspective. However, no verbal response provided at the pre-bid conference binds the County. Only those responses to written and responded to by the County in written communications will be official.

END OF SECTION

SECTION 1

INSTRUCTIONS TO BIDDERS

A. **Contract Documents**

The Contract Documents include the Invitation to Bid, Instructions to Bidders, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the County prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings and addenda, together with written amendments, change orders, field orders and the Construction Manager's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement. Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils report and drawings of physical conditions in or relating to existing surface structures at or contiguous to the site are not Contract Documents. The Contract Documents shall define and describe the complete work to which they relate.

B. **Definitions:** Where the following words or the pronouns used in their stead occur herein, they shall have the following meaning. If a conflict exists as to the meaning of a word, the definition existing in the General Conditions, if present, shall govern.

Change Order - A written order to the Contractor issued by the County pursuant to Fulton County Policy and Procedures 800-6 for changes in the work within the general scope of the contract documents, adjustment of the contract price, extension of the contract time, or reservation of determination of a time extension.

Construction Manager or Engineer shall mean Fulton Construction Management Partners, the County authorized representative for this project.

Contractor shall mean the party of the second part to the Contract Agreement or the authorized and legal representative of such party.

Contract Documents include the Contract Agreement, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the County prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings and addenda, together with written amendments, change orders, field orders and the Construction Manager's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement. Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils report and drawings of physical conditions in or relating to existing surface structures at or contiguous to the site are not Contract Documents.

Contract Price - The sum specified in the Agreement to be paid to the Contractor in consideration of the Work.

Contract Time shall mean the number of consecutive calendar days as provided in the Contract Agreement for completion of the Work, to be computed from the date of Notice to Proceed.

Owner or County shall mean Fulton County Government, party of the first part to the Contract Agreement, or its authorized and legal representatives.

Day - A calendar day of twenty-four hours lasting from midnight of one day to midnight the next day.

Design Consultant shall mean the firm or corporation responsible for the detailed design drawings and specifications.

Director - Director of the Department of Public Works of Fulton County, Georgia or the designee thereof.

Final Completion shall mean the completion of all work as required in accordance with the terms and conditions of the contract documents.

Liquidated Damages shall mean the amount, stated in the Contract Agreement, which the Contractor agrees to pay to the Owner for each consecutive calendar day beyond the Contract time required to complete the Project or for failing to comply with associated milestones. Liquidated Damages will end upon written notification from the Owner of Final Acceptance of the Project or upon written notification of from the Owner of completion of the milestone.

Notice to Proceed - A written communication issued by the County to the Contractor authorizing it to proceed with the work, establishing the date of commencement and completion of the work, and providing other direction to the Contractor.

Products shall mean materials or equipment permanently incorporated into the work.

Program Manager - Not used in this contract. Delete all references.

Project Manual - The Contract Documents.

Provide shall mean to furnish and install.

Substantial Completion - The date certified by the Construction Manager when all or a part of the work, as established pursuant to General Condition 0700-81, is sufficiently completed in accordance with the requirements of the contract documents so that the identified portion of the work can be utilized for the purposes for which it is intended.

Work or Project - All of the services specified, indicated, shown or contemplated by the contract documents, and furnishing by the Contractor of all materials, equipment, labor, methods, processes, construction and manufacturing materials and equipment, tools, plans, supplies, power, water, transportation and other things necessary to complete such services in accordance with the contract documents to insure a functional and complete facility.

- C. **Bidder's Modification and Withdrawal of Bids:** A Bidder may modify or withdraw its bid by written request, provided that the request is received by the County prior to the bid due date and time at the address to which bids are to be submitted. Provided further, that in case of an electronic request (i.e. facsimile, e-mail, etc.) a written confirmation thereof over the authorized signature of the Bidder must be received by the County at the address to which original Bids are to be submitted within three (3) calendar days after issue of the electronic message. Following withdrawal of its bid, the Bidder may submit a new, providing delivery is affected prior to the established bid opening date and time. **No bid may be withdrawn after bid due date for sixty (60) calendar days.**
- D. **Addenda and Interpretations:** No interpretations of the meaning of the Drawings, Specifications or other pre-bid documents will be made to any Bidder orally. Bidders requiring clarification or interpretation of the Bidding Documents shall make a request to Darlene A. Banks no later than **2:00 PM March 5, 2007**. Written requests for clarification or interpretation may be mailed, hand delivered, e-mailed or faxed to the Assistant Purchasing Agent at the address below, e-mail address or fax number. Telephone inquiries will not be accepted.

Darlene A. Banks, Assistant Purchasing Agent
Department of Purchasing and Contract Compliance
Fulton County Public Safety Building
130 Peachtree Street, S.W., 1168
Atlanta, GA 30303
Fax: (404) 893-1745
Darlene.Banks@fultoncountyga.gov

Only communications from firms that are in writing and signed will be recognized by the County as duly authorized expressions on behalf of proposers/bidders. Any and all such interpretations and

any supplemental instructions will be in the form of written Addenda to the Specifications which, and if any addenda are issued to this Invitation to Bid.

- E. **Site Examination:** There will be no site visit for this project. However, bidders are encouraged to visit the route of the reuse main per the design drawings on their own.

Bid: All Bids must be made on the Bid forms contained herein. The Bid shall be enclosed in a sealed envelope, addressed to Department of Purchasing and Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168 Atlanta, Georgia 30303 and labeled "Bid for ITB-07ITB54597K-DB, W035 - RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT. **THE BIDDER IS ALSO REQUIRED TO DISPLAY THE GEORGIA UTILITY CONTRACTOR LICENSE NUMBER ON THE OUTSIDE OF THE SEALED BID ENVELOPE.**

REQUIRED SUBMITTALS: The bidder **must complete and execute** the following:

1. Bid Form
2. Bid Schedule
3. Bid Bond
4. Certification of Acceptance of Bid/Proposal Requirements
5. Corporate or Partnership Certificate
6. Non-Collusion Affidavit of Prime Bidder
7. Non-Collusion Affidavit of Subcontractor
8. Contract Compliance Forms, fully executed
 - a. Promise of Non-Discrimination (Exhibit A)
 - b. Employment Report (Exhibit B)
 - c. Schedule of Intended Subcontractor Utilization (Exhibit C)
 - d. Letter of Intent to Perform As a Subcontractor or Provide Materials or Services (Exhibit D)
 - e. Declaration Regarding subcontractor Practices (Exhibit E)
 - f. Joint Venture Disclosure Affidavit (Exhibit F)
 - g. Equal Business Opportunity (EBO) Plan

Any bids received after the stated time and date shall not be considered. It shall be the sole responsibility of the bidder to have his/her bid delivered to the Fulton County Department of Purchasing and Contract Compliance for receipt on or before the stated time and date (section 00020). If a bid is sent by U.S. Mail, the bidder shall be responsible for its timely delivery to the Purchasing Department. Bids delayed by mail will not be considered, shall not be opened, and arrangements shall be made for their return at the bidder's request and expense.

The original signed bid with three (3) copies shall be submitted in a sealed package, clearly marked on the outside "Bid for the W035 – RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT ITB No. 07ITB54597K-DB". *Additionally, Bidder is to write their **Utility Contractor License Number on the outside of the sealed package containing the bid.** Failure to put the Utility Contractor License number on the package will result in the bid being determined to be non-responsive.*

Bid shall be publicly opened, with only the names and total bid price of the bidders disclosed at the opening.

- F. **Bid and Contract Security:** A Bid Bond for an amount equal to five percent (5%) of the bid amount must accompany each Proposal. The bid bond shall be submitted in a separate, sealed envelope marked "Bid Bond".

Bids must be accompanied by a bid bond or certified check in an amount of five percent (5%) of the TOTAL AMOUNT of the base bid. The bid bond or certified check shall apply ONLY TO THIS BID. The bid name and contract number must appear on the security instrument. The bond must remain in full force and effect until the Bidder executes the final Contract. Bids not satisfying the bonding requirements of this project will be declared non-responsive.

Any bid bond, performance bond, payment bond, or security deposit required for public works construction contract shall be approved and filed with purchasing agent. At the option of the County, if the surety named in the bond is other than a surety company authorized by law to do business in this state pursuant to a current certificate of authority to transact surety business by the Commissioner of Insurance, such bond shall not be approved and filed unless such surety is on the United States Department of Treasury's list of approved bond sureties.

A Purchasing Agent shall approve as to form and as to the solvency of the surety any bid bond, performance bond, or payment bond required by this. In the case of a bid bond, such approval shall be obtained prior to acceptance of the bid or proposal. In the case of payment bonds and performance bonds, such approval shall be obtained prior to the execution of the contract.

Whenever, in the judgment of the County:

- (1) Any surety on a bid, performance, or payment bond has become insolvent;
- (2) Any corporation surety is not longer certified or approved by the Commissioner of Insurance to do business in the state; or
- (3) For any cause there are no longer proper or sufficient sureties on any or all the bonds

The County may require the contractor to strengthen any or all of the bonds or to furnish a new or additional bond or bonds within ten days. Thereupon, if so ordered by the County, all work on the contract shall cease unless such new or additional bond or bonds are furnished. If such bond or bonds are not furnished within such time, the County may terminate the contract and complete the same as the agent of and at the expense of the contractor and his or her sureties.

As a condition of responsiveness the bidder must contain a Bid Bond for an amount equal to 5% of the bid amount. The Bid Bond shall be included in a separate envelope marked on the outside "Bid Bond". Checks or letters of credit of any type will not be accepted. A certified cashier's check will be acceptable. Provide a completed and fully executed Bid Bond. When the bidder's package is opened, a purchasing agent will verify the presence of the Bid Bond and remove it from the Proposal Package.

If the bidder withdraws its bid from the competition after the selection of its bid for a reason not authorized by Georgia law, the County will proceed on the Bid Bond, along with any other available remedies.

The Surety of the Bid Bond shall be from a surety company authorized to do business in the State of Georgia, shall be listed in the Department of Treasury Circular 570, and shall have an underwriting limitation in excess of 100% of the bid amount. The Bonds and Surety shall be subject to approval by the County Attorney.

Attorneys-in-fact for bidders who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

- G. **Right to Reject Bids:** The County reserves the right to reject any or all bids and to waive informalities. No bids will be received after the time set for opening bids. Any unauthorized conditions, limitations or provisions attached to the Bid, except as provided herein, will render it informal and may cause its rejection. Unbalanced bids will be subject to rejection. Any bidder may withdraw his/her bid, either personally or by telegraphic or written request, at any time prior to the scheduled closing time for receipt of bids. Telegraphic or written requests for withdrawal must be in the possession of the County prior to the closing time for receipt of bids.
- H. **Applicable Laws:** All applicable laws and regulations of the State of Georgia and ordinances and regulations of Fulton County shall apply. Protestors shall seek resolution of their complaints in the manner provided in the Fulton County Code of Laws §2-324, which is incorporated by reference herein.
- I. **Examination of Contract Documents:** Prospective bidders shall examine the contract documents and before submitting a bid, shall make a written request to the County for an interpretation or correction of any ambiguity, in consistency or error therein which could be discovered by a bidder.

At the bid opening each bidder shall be presumed to have read and be familiar with the contract documents.

- J. **Termination:** The County may terminate the contract resulting from this solicitation at any time the vendor fails to carry out the contract provisions, if in the opinion of the County, the performance of the contract is unreasonably delayed, or the vendor is in direct violation of the contract conditions. The County shall provide the vendor with notice of any conditions which violate or endanger the performance of the contract and, if after such notice the contractor fails to remedy such conditions within thirty (30) days, to the satisfaction of the County, the County may exercise their option in writing to terminate the Contract without further notice to the Contractor and order the Contractor to stop work immediately and vacate the premises. Vendor agrees by its bid submission that the County's decision is final and valid.
- K. **Indemnification and Hold Harmless Agreement:** The successful contractor will agree to indemnify, save harmless and defend the County, its agents, servants, and employees from all lawsuits, claims, demands, liabilities, losses and expenses for or on account of any injury or loss in connection with the work performed under this contract: Provided, however the Contractor shall not be liable for any damages resulting for the sole negligent or intentional acts or omission of the County and its employees, agents or representatives.
- L. **Bid Opening:** Bids will be opened in public and read aloud. All bidders are requested to be present at the opening.
- M. **Determination of Successful Bidder:** Fulton County desires to complete this work in a timely manner. The Contract will be awarded to the lowest responsive, responsible bidder(s), if awarded.
- 1) **Responsibility:** The determination of the bidder's responsibility will be made by the County based on whether the bidder meets the following minimum requirements:
 - a) The County reserves the right to reject any bid if the evidence submitted by, or investigation of, the bidder fails to satisfy the County that he/she is properly qualified to carry out the obligations of the Contract.
 - b) Is properly licensed to perform this type of work in Fulton County. Bidders must have a utility contractors license to perform this work. O.C.G.A. §43-14-8.3 (h)
 - c) Maintains a permanent place of business individually or in conjunction with the prime contractor.
 - d) Has the appropriate and adequate technical experience. Designated Project Manager must be proficient in all aspects of contracted work.
 - e) Has adequate personnel and equipment to do the work expeditiously.
 - f) Has suitable financial means to meet obligations incidental to the work.
 - 2) **Responsiveness:** The determination of responsiveness will be made by the County based on a consideration of whether the bidder has submitted a complete Bid form without irregularities, excisions, special conditions, or alternative bids for any item unless specifically requested in the Bid form.
- N. **Wage Clause:** Pursuant to 102-391, Each Contractor shall agree that in the performance of the Contract he will comply with all lawful agreements, if any, which the Contractor had made with any association, union, or other entity, with respect to wages, salaries, and working conditions, so as not to cause inconvenience, picketing, or work stoppage.
- O. **Notice of Award of Contract:** As soon as possible, and within sixty (60) days after receipt of bids, the County shall notify the successful Bidder of the Award of Contract.

The award shall be made by the Board of Commissioners of Fulton County to the lowest responsive, responsible bidder(s) as soon as possible after receipt of bids, taking into consideration price and the responsiveness to the requirements set forth in the Invitation for Bid. In such case, no claim shall be made by the selected Contractor(s) for loss of profit if the contract is not awarded or awarded for less work than is indicated and for less than the amount of his bid. The total of the

awarded contract shall not exceed the available funds allocated for this project.

Should the County require additional time to award the contract, the time may be extended by mutual agreement between the County and the successful bidder. If an Award of Contract has not been made within sixty (60) days from the bid date or within the extension mutually agreed upon, the Bidder may withdraw the Bid without further liability on the part of either party.

Any award made by the Board of Commissioners as a result of this bid will begin from the date of the notice to proceed. The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order from the user department. The contract shall become effective on the Contract Date and shall continue in effect until the end of the term of the contract or until the project has been closed-out unless earlier terminated pursuant to the termination provisions of the contract.

- P. **Execution of Contract Documents:** Upon notification of Award of Contract, the County shall furnish the Contractor the conformed copies of Contract Documents for execution by the Contractor and Contractor's surety.

Within ten (10) days after receipt the Contractor shall return all the documents properly executed by the Contractor and the Contractor's surety. Attached to each document shall be an original power-of-attorney for the person executing the bonds for the surety and certificates of insurance for the required insurance coverage.

After receipt of the documents executed by the Contractor and his surety with the power-of-attorney and certificates of insurance, the County shall complete the execution of the documents. Distribution of the completed documents will be made upon completion.

Should the contractor and/or surety fail to execute the documents within the time specified, the County shall have the right to proceed on the Bid Bond accompanying the bid.

If the County fails to execute the documents within the time limit specified, the Contractor shall have the right to withdraw the Contractor's bid without penalty.

Should an extension of any of the time limits stated above be required, this shall be done only by mutual agreement between both parties.

Any agreement or contract resulting from the acceptance of a bid shall be on a County approved document form. The County reserves the right to reject any agreement that does not conform to the Invitation for Bid and any County requirements for agreements and contracts. The County reserves the right to modify the agreement resulting from this bid upon the recommendation of the County Attorney.

- Q. **Joint Venture** Any Bidder intending to respond to this solicitation as a joint venture must submit an executed joint venture agreement with its offer. The agreement must designate those persons or entities authorized to execute documents or otherwise bind the joint venture in all transactions with Fulton County, or be accompanied by a document, binding upon the joint venture and its constituent members, making such designation. Offers from joint ventures that do not include these documents will be rejected as being non-responsive.

- R. **Contractors Compliance With All Assurances And/Or Promises Made In Response To Procurement:** Should any Bidder submit a response to the County promising to provide a certain level of service for either the scope of work, MFBE participation, or any other matter, including where such promise or assurance is greater than what is required by the procurement documents, and should this response containing the promise or assurance be accepted by the County and made a part of the Contract Documents, then this degree or level of service promised by the bidder relating to the scope of work, MFBE participation, or other matter shall be considered to be a material part of the Agreement between the bidder and the County, such that the bidder's failure to provide the agreed upon degree or level of service or participation shall be a material breach of the Agreement giving the County just cause to terminate the Agreement for cause, pursuant to the General Conditions of the Agreement.

FULTON COUNTY PURCHASING DEPARTMENT**BID GENERAL REQUIREMENTS****BID# 07ITB5459K-DB, W035- RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT**

The following information pertains to the submission of a Bid to Fulton County, and contains instructions on how Bids must be presented in order to be considered. Listed below are the requirements for all Bidders interested in doing business with Fulton County.

1. The Bid sheets included in this Invitation to Bid ("Bid") must be fully completed and returned with the Bid unless otherwise specified in writing by the Purchasing Department. Type or neatly print the date, company name, and the full legal name and title of the person(s) signing the Bid in the place provided at the bottom of each Bid sheet. Any additional sheets submitted must contain the same signature and Bidder information.
2. All signatures must be executed by person(s) having contracting authority for the Bidder.
3. Absolutely no fax Bids or reproduction Bids will be accepted, except that photocopies may be submitted in addition to the original when multiple copies of the Bid are specifically requested in the solicitation.
4. The envelope in which the Bid response is submitted must be sealed and clearly labeled with the Bid number, project title, due date and time, and the name of the company or individual submitting the proposal. Bids must be received by the opening date and time shown on this Bid in order to be considered. The Purchasing Agent has no obligation to consider Bids which are not in properly marked envelopes. Contract Compliance submittals shall be submitted in a separate sealed envelope or package.
5. The original and the required number of copies of the Bid must be returned to:

Fulton County Purchasing Agent
Fulton County Department of Purchasing and Contract Compliance
130 Peachtree Street, S.W., Suite 1168
Atlanta, Georgia 30303

Any inquiries, questions, clarifications or suggestions regarding this solicitation should be submitted in writing to the Purchasing Contact Person. Contact with any other County personnel in regard to a current solicitation is strictly prohibited in accordance with Fulton County "No Contact" policy outlined in Section 35.

6. Show information and prices in the format requested. Prices are to be quoted F.O.B. Destination, and must include all costs chargeable to the Contractor executing the Contract, including taxes. Unless otherwise provided in the Contract, Fulton County shall have no liability for any cost not included in the price. The Contractor shall provide Fulton County the benefit through a reduction in price of any decrease in the Contractor's costs by reason of any tax exemption based upon Fulton County's status as a tax-exempt entity.
7. All prices Bid must be audited by the Bidder to ensure correctness before the Bid is submitted. The Bidder is solely responsible for the accuracy of information placed on a Bid sheet, including prices. Clerical or mathematical error is insufficient to void a successful Bid but a Bidder may withdraw a sealed Bid prior to opening without a penalty.
8. All prices must be submitted in the format requested and less all trade discounts. When multiple items are being Bid, Bidder must show both the unit price and the total extended price for each item. When applicable, the Bidder must include an additional lump sum Bid for groups or items. In the event a Bidder is offering an additional discount on groups of items, Bidder must indicate the total lump sum Bid for the particular group of items before any extra discount, the amount of extra discount, and the net total for the particular group. In the event of an extension error, unit pricing shall prevail.

9. By submitting a signed Bid, Bidder agrees to accept an award made as a result of that Bid under the terms and conditions spelled out in the Bid documents. In the event of a conflict between the different Bid documents, the County's cover Contract (if used) shall have precedence, followed in order by the Invitation to Bid, Purchase Order, Bid, Contractor's Warranty Agreement, Maintenance Agreement, and/or other Contractor provided agreements.
10. A Bidder may submit only one (1) Bid response for each specific Bid solicitation unless otherwise authorized in the specifications.
11. All prices submitted by the Bidder to Fulton County must be guaranteed by the authorized person(s) against any price increase for the time period designated in the Bid specifications, and Fulton County must be given the benefit of any price decrease occurring during such designated time period.
12. All items Bid must be new. Used, rebuilt and refurbished items will not be considered unless specifically authorized by Fulton County in the written specifications.
13. All Bidders must specify in the Bid response the earliest actual delivery date for each item unless otherwise specified in writing by Fulton County. The delivery date may be a factor in deciding the Bidder's capability to perform.
14. A successful Bidder's delivery ticket(s) and invoice(s) must list each item separately and must show Fulton County's purchase order number as well as the proper department and address to which delivery was made, as listed on the purchase order or in the Bidder's contract with Fulton County.
15. Unless clearly shown as "no substitute" or words to that effect, any items in this invitation to Bid which have been identified, described or referenced by a brand name or trade name are for reference only. Such identification is intended to be descriptive but not restrictive, and is to indicate the general quality and characteristics of products that may be offered. Each item Bid must be individually identified as to whether it is a specified item or an equivalent item by typing or printing after the item(s): The brand name; model or manufacturer's number, or identification regularly used in the trade. Deviations from the specifications must be clearly and fully listed on the Bid sheet, including photographs or cuts, specifications, and dimensions of the proposed "alternate". Fulton County is the sole judge of "exact equivalent", or "alternate". The factors to be considered are: function, design, materials, construction, workmanship, finishes, operating features, overall quality, local service facilities, warranty terms and service, and other relevant features of item(s) Bid.
16. For all Bids, Fulton County reserves the right to request representative samples. If requested, samples must be delivered at the Bidder's cost within three (3) business days. Samples are submitted at the risk of the Bidder and may be subjected to destructive tests by Fulton County. Samples must be plainly tagged with Fulton County's Bid number, item name, manufacturer, and the name of the Bidder.
17. Item(s) Bid must be complete and ready to operate. No obvious omissions of components or necessary parts shall be made even though the specifications may not detail or mention them. Unit(s) must be furnished with factory installed equipment and must be comparable with the basic form, fit, and functional requirements which are all to be included in the base price as well as any other equipment included as standard by the manufacturer or generally provided to the buying public.
18. All successful Bidders must assume full responsibility for all item(s) damaged prior to F.O.B. Destination delivery and agree to hold harmless Fulton County of all responsibility for prosecuting damage claims.
19. All successful Bidders must assume full responsibility for replacement of all defective ordamaged goods within thirty (30) days of notice by Fulton County of such defect or damage.

20. All successful Bidders must assume full responsibility for providing or ensuring warranty service on any and all items including goods, materials, or equipment provided to the County with warranty coverage. If a successful Bidder is not the manufacturer, all manufacturers' warranties must be passed through to Fulton County. The Bidder and not Fulton County is responsible for contacting the manufacturer of the warranty service provided during the warranty period and supervising the completion of the warranty service to the satisfaction of Fulton County.
21. As a successful Bidder providing any equipment which requires fitting and assembly, the Bidder shall be solely responsible for such installation being performed by a manufacturer's authorized or approved servicer or an experienced worker, utilizing workmanship of the highest caliber. The Bidder must verify all dimensions at the site, shall be responsible for their correctness, and shall be responsible for the availability of replacement parts when specified in writing by Fulton County in the specifications, purchase order, or other contract.
22. A successful Bidder is solely responsible for disposing of all wrappings, crating, and other disposable material upon deliver of item(s).
23. All Bidders are required to be authorized distributors or regularly engaged in the sale or distribution of the type of goods, materials, equipment or services for which the Bidder is submitting a Bid response in addition, all Bidders are required to provide Fulton County with three (3) written references documenting the successful completion of Bids or contracts for the types of items including goods, materials, equipment, or services for which the Bidder is submitting a Bid response. In instances where a Bidder has never supplied such goods, material, equipment, or services before, the Bidder must submit with the Bid response a statement and supporting documentation demonstrating such expertise, knowledge, or experience to establish the Bidder as a responsible Bidder, capable of meeting the Bid requirements should an award be made. No exceptions to this provision will be made unless authorized in the Bid specifications.
24. Bidders may be required to furnish evidence that they maintain permanent places of business of a type and nature compatible with their Bid proposal, and are in all respects competent and eligible vendors to fulfill the terms of the specifications. Fulton County may make such investigations as it deems necessary to determine the ability of the Bidder to perform such work, and reserves the right to reject any Bidder if evidence fails to indicate that the Bidder is qualified to carry out the obligation of the Contract and to complete the work satisfactorily.
25. All Bidders must comply with all Fulton County Purchasing laws, policies, and procedures, non-discrimination in contracting and procurement ordinances, and relevant state and federal laws including but not limited to compliance with EEOC hiring guidelines and requirements under the Americans with Disabilities Act. Successful Bidder must obtain all permits, licenses, and inspections as required and furnish all labor, materials, insurance, equipment, tools, supervision, and incidentals necessary to accomplish the work in these specifications.
26. If a successful Bidder is unable or unwilling to enter into a Contract with Fulton County subsequent to being granted an award, or who fails to perform in accordance with the Bid specifications the Bidder will be subject to damages and all other relief allowed by law.
27. Successful Bidders contract directly with Fulton County and are the party or parties obligated to perform. Contracts may not be assigned and any failure to perform the Contract in accordance with the specifications will constitute a breach of Contract and may result in a Bidder being found to be "non-responsive" in the future.
28. In case of default by the successful Bidder, Fulton County may procure the articles for services from another source and hold the successful Bidder responsible for any resulting excess cost.
29. The County may award any Bid in whole or in part to one or more vendors or reject all Bids and/or waive any technicalities if it is in the best interests of the County to do so. In the event that all Bids are not rejected, Bids for items including goods, materials, equipment, and services will be awarded to the lowest "responsible" Bidder(s) as determined by Fulton

County. Submitting the lowest Bid, as published at the Bid opening, does not constitute an award or the mutual expectation of an award of a Contract and purchase order. For purposes of this notice and the attached Bid sheets, a purchase order is a Contract to provide items including goods, materials, equipment, and services and is intended to have the full force and effect of a Contract. A breach of the terms and conditions of a purchase order constitutes a breach of Contract.

30. Bids for projects that are solicited pursuant to the Georgia Local Government Public Works Construction Law (O.C.G.A. § 36-91-1 et seq.) may withdrawn as follows:

Competitive sealed Bids ("Bid") may not be revoked or withdrawn until 60 days after the time set by the governmental entity for opening of Bids. At the end of this time period, the Bid will cease to be valid, unless the Bidder provides written notice to the County prior to the scheduled expiration date that the Bid will be extended for a time period specified by the County.

31. In the evaluation of the Bids, any award will be subject to the Bid being:

- A. Compliant to the specification – meets form, fit, and function requirements stated or implied in the specification.
- B. Lowest cost to the County over projected useful life.
- C. Administratively Compliant – Including all required bonds, insurance, established quality of work and general reputation, financial responsibility, relevant experience, and related criteria.

32. All proposals and Bids submitted to Fulton County are subject to the Georgia "Open Records Act", Official Code of Georgia, Annotated (O.C.G.A.) §50-18-70 et seq.

33. All proposals and Bids submitted to Fulton County involving Utility Contracting are subject to the Georgia law governing licensing of Utility Contractors, O.C.G.A. §43-14-8.2(h). The Utility Contractor License number of the person who will perform the utility work shall be written on the face of the Bid envelope.

34. The apparent silence of this specification, and any supplement thereto, as to details, of the omission from it of a detailed description concerning any point, will be regarded as meaning only the best commercial practices are to prevail. Only materials of the highest quality, correct type, size, and design are to be used. All interpretations of this specification will be made upon the basis of this statement, with Fulton County interpretation to prevail.

35. It is the policy of Fulton County that the evaluation and award process for County contracts shall be free from both actual and perceived impropriety, and that contacts between potential vendors and County officials, elected officials and staff regarding pending awards of County contracts shall be prohibited.

- A. No person, firm, or business entity, however situated or composed, obtaining a copy of or responding to this solicitation, shall initiate or continue any verbal or written communication regarding this solicitation with any County officer, elected official, employee, or designated County representative, between the date of the issuance of this solicitation and the date of the County Manager's recommendation to the Board of Commissioners for award of the subject contract, except as may otherwise be specifically authorized and permitted by the terms and conditions of this solicitation.
- B. All verbal and written communications initiated by such person, firm, or entity regarding this solicitation, if same are authorized and permitted by the terms and conditions of this solicitation, shall be directed to the Purchasing Agent.
- C. Any violation of this prohibition of the initiation or continuation of verbal or written communications with County officers, elected officials, employees, or designated County representatives shall result in a written finding by the Purchasing Agent

that the submitted Bid or proposal of the person, firm, or entity in violation is “non-responsive”, and same shall not be considered for award.

36. Any Bidder intending to respond to this solicitation as a Joint Venture must submit an executed Joint Venture Agreement with this Bid. This agreement must designate those persons or entities authorized to execute documents or otherwise bind the Joint Venture in all transactions with Fulton County, or are accompanied by a document, binding upon the Joint Venture and its constituent members, making such designation. Bids from Joint Ventures that do not include these documents will be rejected as being “non-responsive”.
37. Any Bidder intending to respond to this solicitation must complete all of the Procurement Affidavit Forms provided in this solicitation. Bids that do not include these completed documents will be rejected as being “non-responsive”.

Required Bid Submittal Check List for Invitation To Bid (ITB)

The following submittals shall be completed and submitted with each bid (see table below "Required Bid Submittal Check List."). Please check to make sure that the required submittals are in the envelope before it is sealed. Failure to submit all required submittals may deem your proposal non-responsive.

Submit one (1) Original bid, signed and dated and **three (3) complete** copies of the Original Bid including all required documents.

Item #	Required Bid Submittal Check List	Check (√)
1	Bid Form – submittal shall show amounts for both Base Bid and Alternate and shall be signed and sealed by the bidder. All dollar amounts must be Both in writing AND figures and represent prices for the published scope of work without exceptions.	
2	Acknowledgement of each Addendum	
3	Bid Bond (separate envelope if Public Works Construction project)	
4	Purchasing Forms Form A - Non-Collusion Affidavit of Prime Bidder/Offeror Form B - Non-Collusion Affidavit of Sub-contractor Form C - Certificate of Acceptance of Request for Bid/Proposal Requirements Form D - Georgia Utility Contractor License Form E - Certificate Regarding Debarment Form F - Corporate Certificate Form G - Disclosure Form & Questionnaire	
5	Office of Contract Compliance Requirements Exhibit A - Promise of Non-Discrimination Exhibit B - Employment Record Exhibit C - Schedule of Intended Subcontractor Utilization Exhibit D - Letter of Intent to Perform as Subcontractor Exhibit E - Declaration Regarding Subcontractor Practices Exhibit F - Joint Venture Disclosure Affidavit Exhibit G - Prime Contractor/Subcontractor Utilization Report Equal Business Opportunity Plan (EBO Plan)	
6	Risk Management Insurance Provisions Form (Section 6) and proof of Insurance – ie., letter from Insurance Company or Certificate of Insurance with ITB No. included.	
7	Statement of Qualifications of Prime Contractor	
8	Statement of Qualifications of Key Personnel	
9	Statement of Qualifications of Key Subcontractors	
10	Pricing Form (Section 11) – all pages, completely filled out	
11	<u>Any additional requirements that the User Department would like to include should be added to this check list.</u>	
12		
13		
14		
15		

END OF SECTION NO. 1

SECTION 2**BID FORM****W035- RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT**

Submitted _____, 2007

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Bid as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Bid or in the Contract to be entered into; that this Bid is made without connection with any other person, company or parties making a Bid; and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the Drawings and Specifications for the work and contractual documents relative thereto, and has read all instructions to Bidders and General Conditions furnished prior to the openings of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees, if this Bid is accepted, to contract with the Board of Commissioners of Fulton County, Atlanta, Georgia, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary, and to complete the construction of the work in full and complete accordance with the shown, noted, and reasonably intended requirements of the Specifications and Contract Documents to the full and entire satisfaction of the Board of Commissioners of Fulton County, Atlanta, Georgia, with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents for the following prices.

THE BASE BID IS THE AMOUNT UPON WHICH THE BIDDER WILL BE FORMALLY EVALUATED AND WHICH WILL BE USED TO DETERMINE THE LOWEST RESPONSIBLE BIDDER.

The base bid may not be withdrawn or modified for a period of sixty (60) days following the receipt of bids.

BASE BID AMOUNT (Total of Items 1 through 38, inclusive, from Pricing Form - Section 11)

\$ _____

(Dollar Amount in Numbers)

(Dollar Amount in Words)

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within **Three Hundred and Sixty Five (365)** consecutive calendar days from and including said date.

The Bidder declares that he understands that the quantities shown for the unit prices items are subject to either increase or decrease, and that should the quantities of any of the items of work be increased, the Bidder proposes to do the additional work at the unit prices stated herein; and should the quantities be decreased, the Bidder also understands that payment will be made on the basis of actual quantities at the unit price bid and will make no claim for anticipated profits for

any decrease in quantities; and that actual quantities will be determined upon completion of work, at which time adjustments will be made to the contract amount by direct increase or decrease.

The Bidder furthermore agrees that, in the case of a failure on his part to execute the Contract Agreement and Bonds within ten days after receipt of conformed contract documents for execution, the Bid Bond accompanying his bid and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure.

The undersigned acknowledges receipt of the following addenda (list by the number and date appearing on each addendum) and thereby affirms that its Bid considers and incorporates any modifications to the originally issued Bidding Documents included therein.

ADDENDUM # _____ DATED _____

ADDENDUM # _____ DATED _____

ADDENDUM # _____ DATED _____

ADDENDUM # _____ DATED _____

BIDDER: _____

Signed by: _____
[Type or Print Name]

Title: _____

Business Address: _____

Business Phone: _____

Bidder's Contractor License No: _____
[State/County]

License Expiration Date: _____

Enclosed is a Bid Bond in the approved form, in the sum of:

_____ Dollars

(\$_____) according to the conditions of "Instructions to Bidders" and provisions thereof.

END OF SECTION NO. 2

**SECTION 3
PURCHASING FORMS & INSTRUCTIONS**

This section contains the procurement forms that are required to be executed and submitted with the bid package. This section does not contain all forms required to be included with the bid package submittal.

To be deemed responsive to this RFP, Bidders must provide the information requested and complete in detail all Purchasing Forms. The appropriate individual(s) authorized to commit the Bidder to the Project must sign the Purchasing Forms. Bidders should reproduce each Purchasing Form, as required, and complete the appropriate portions of the forms provided in this section.

- Form A: Non-Collusion Affidavit of Prime Bidder/Offeror
- Form B: Non-Collusion Affidavit of Sub-Contractors
- Form C: Certificate of Acceptance of Request for Bid/Proposal Requirements
- Form D: Contractor's Georgia Utility License Certification
- Form E: Certification Regarding Debarment
- Form F: Corporate Certificate
- Form G: Disclosure Form and Questionnaire

Form A

NON-COLLUSION AFFIDAVIT OF BIDDER/OFFEROR

STATE OF GEORGIA

COUNTY OF FULTON

I, _____, certify that pursuant to Fulton County Code Section 2-320 (11), this bid or proposal is made without prior understanding, agreement or connection with any corporation, firm or person submitting a bid for the same work, labor or service to be done or the supplies, materials or equipment to be furnished and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of state and federal law and can result in fines, prison sentences and civil damages awards. I agree to abide by all conditions of this bid or proposal and certify that I am authorized to sign this bid or proposal for the bidder.

Affiant further states that pursuant to O.C.G.A. Section 36-91-21 (d) and (e), _____ has not, by itself or with others, directly or indirectly, prevented or attempted to prevent competition in such bidding or proposals by any means whatsoever. Affiant further states that (s)he has not prevented or endeavored to prevent anyone from making a bid or offer on the project by any means whatever, nor has Affiant caused or induced another to withdraw a bid or offer for the work.

Affiant further states that the said offer of _____ is bona fide, and that no one has gone to any supplier and attempted to get such person or company to furnish the materials to the bidder only, or if furnished to any other bidder, that the material shall be at a higher price.

(COMPANY NAME)

(PRESIDENT/VICE PRESIDENT)

Sworn to and subscribed before me this _____ day of _____, 200__.

(SECRETARY/ASSISTANT SECRETARY)

(Affix corporate seal here, if a corporation)

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

IF THE OFFEROR IS A PARTNERSHIP, ALL OF THE PARTNERS AND ANY OFFICER, AGENT, OR OTHER PERSON WHO MAY HAVE REPRESENTED OR ACTED FOR THEM IN BIDDING FOR OR PROCURING THE CONTRACT SHALL ALSO MAKE THIS OATH.

IF THE OFFEROR IS A CORPORATION, ALL OFFICERS, AGENTS, OR OTHER PERSONS WHO MAY HAVE ACTED FOR OR REPRESENTED THE CORPORATION IN BIDDING FOR OR PROCURING THE CONTRACT SHALL MAKE THE OATH.

Form B

NON-COLLUSION AFFIDAVIT OF SUBCONTRACTOR

STATE OF GEORGIA

COUNTY OF FULTON

I, _____, certify that pursuant to Fulton County Code Section 2-320 (11), this bid or proposal is made without prior understanding, agreement or connection with any corporation, firm or person submitting a bid for the same work, labor or service to be done or the supplies, materials or equipment to be furnished and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of state and federal law and can result in fines, prison sentences and civil damages awards. I agree to abide by all conditions of this bid or proposal and certify that I am authorized to sign this bid or proposal for the bidder.

Affiant further states that pursuant to O.C.G.A. Section 36-91-21 (d) and (e), _____ has not, by itself or with others, directly or indirectly, prevented or attempted to prevent competition in such bidding or proposals by any means whatsoever. Affiant further states that (s)he has not prevented or endeavored to prevent anyone from making a bid or offer on the project by any means whatever, nor has Affiant caused or induced another to withdraw a bid or offer for the work.

Affiant further states that the said offer of _____ is bona fide, and that no one has gone to any supplier and attempted to get such person or company to furnish the materials to the bidder only, or if furnished to any other bidder, that the material shall be at a higher price.

(COMPANY NAME)

(PRESIDENT/VICE PRESIDENT)

Sworn to and subscribed before me this _____ day of _____, 200__.

(SECRETARY/ASSISTANT SECRETARY)

(Affix corporate seal here, if a corporation)

Notary Public: _____

County: _____

Commission Expires: _____

NOTE:

IF THE OFFEROR IS A PARTNERSHIP, ALL OF THE PARTNERS AND ANY OFFICER, AGENT, OR OTHER PERSON WHO MAY HAVE REPRESENTED OR ACTED FOR THEM IN BIDDING FOR OR PROCURING THE CONTRACT SHALL ALSO MAKE THIS OATH.

IF THE OFFEROR IS A CORPORATION, ALL OFFICERS, AGENTS, OR OTHER PERSONS WHO MAY HAVE ACTED FOR OR REPRESENTED THE CORPORATION IN BIDDING FOR OR PROCURING THE CONTRACT SHALL MAKE THE OATH.

Form C

FULTON COUNTY CERTIFICATE OF ACCEPTANCE OF BID/PROPOSAL REQUIREMENTS

This Is To Certify That On This Day Bidder/Proposer Acknowledges That He/She Has Read This Bid Document, Pages _____ To _____ Inclusive, Including Addendum(s) _____ To _____, And/Or Appendices _____ To _____, In Its Entirety, And Agrees That No Pages Or Parts Of The Document Have Been Omitted, That He/She Understands, Accepts And Agrees To Fully Comply With The Requirements Therein, And That The Undersigned Is Authorized By The Bidding/Proposing Company To Submit The Bid/Proposal Herein And To Legally Obligate The Bidder/Proposer Thereto.

Company: _____

Signature: _____

Name: _____

Title: _____

Date: _____

(Corporate Seal)

Form D

CONTRACTOR'S GEORGIA UTILITY LICENSE CERTIFICATION

Contractor's Name: _____

Utility Contractor's Name: _____

Expiration Date of License: _____

(ATTACHED COPY OF LICENSE)

I certify that the above information is true and correct and that the classification noted is applicable to the Bid for this Project.

Signed: _____

Date: _____

Form E

CERTIFICATION REGARDING DEBARMENT

- (1) The Offeror certifies that neither it or its subcontractors is presently debarred, suspended, proposed for debarment, declared ineligible, or otherwise excluded from doing business with any government agency. Any such exclusion may cause prohibition of your firm from participating in any procurement by the Fulton County Government.
- (1) If the Offeror is unable to certify to any of the statements in this certification, such Offeror or subcontractor shall attach an explanation to this bid or proposal.

INSTRUCTIONS FOR CERTIFICATION

By signing and submitting this certification, the Offeror is providing the certification set out below:

- (1) The certification in this clause is a material representation of fact upon which reliance will be placed. If it is later determined that the prospective vendor knowingly rendered a false certification, the Purchasing Agent may pursue all available remedies, including suspension and/or debarment, for withdrawal of award or termination of a contract.
- (2) The prospective Offeror shall provide immediate written notice to the Purchasing Agent if at anytime the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- (3) Offeror shall be under a continuing duty to immediately inform the Purchasing Agent in writing of any changes, if as a result of such changes, the Offeror certification regarding debarment is affected.

DEBARMENT ORDINANCE

The following Section 2-322 of Fulton County Code of Laws establishes the procedure for the debarment of contractors.

(a) Authority to suspend.

After reasonable notice to the entity involved and reasonable opportunity for that entity to be heard, the Purchasing Agent, after consultation with user department, the County Manager and the County Attorney shall have the authority to suspend an entity for cause from consideration for award of county contracts. As used in this section, the term entity means any business entity, individual, firm, contractor, subcontractor or business corporation, partnership, limited liability corporation, firm, contractor, subcontractor or business structured; provided, further, that any such entity shall also be subject to suspension under this section if any of its constituents, members, subcontractors at any tier of such entity's and the entity, or any constituent or member, knew or should have known of the commission of the act. The suspension shall be for a period not to exceed three (3) years unless cause is based on a felony conviction for an offense related or associated with fraudulent contracting or misappropriation of funds wherein the suspension shall not exceed seven (7) years.

(b) Causes for Suspension. The causes for suspension include:

- 1) Conviction for commission of a criminal offense as an incident to obtain or attempting to obtain a public or private contract or subcontract, or in performance of such contract or subcontract;

- 2) Conviction of state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property or other offense indicating a lack of business integrity or business honesty which currently, seriously and directly affects responsibility as a county contractor.
- 3) Conviction of state or federal anti-trust statutes arising out of the solicitation and submission of bids and proposals;
- 4) Violation of contract provisions, as set forth below, of a character which is regarded by the Purchasing Agent to be so serious as to justify suspension action:
 - a. Failure to perform in accordance with the specifications within a time limit provided in a county contract;
 - b. A recent record of failure to perform or unsatisfactory performance in accordance with the terms of one or more contracts; provided, that failure to perform or unsatisfactory performance caused by acts beyond the control of the contractor shall not be considered to be a basis for suspension;
 - c. Material representation of the composition of the ownership or workforce or business entity certified to the county as a minority business enterprise; or
 - d. Falsification of any documents.
- 5) For violation of the ethical standards set forth in Fulton County Code Chapter 9, Code of Ethics.
- 6) Knowing misrepresentation to the county, of the use which a majority owned contractor intends to make a minority business enterprise (a business entity at least 51 percent of which is owned and controlled by minority persons, as defined in Fulton County Code Chapter 6, Article B, Minority Business Enterprise Affirmative Action Program and certified as such by the County) as a subcontractor or a joint venture partner, in performing work under contract with the County.

Failure to fully and truthfully provide the information required, may result in the disqualification of your bid/proposal from consideration or termination of the Contract, once awarded. This document must be completed and included as a part of the bid/proposal package along with other required documents.

[SIGNATURES ON NEXT PAGE]

Under penalty of perjury, I declare that I have examined this certification and all attachments hereto, if applicable, to the best of my knowledge and belief, and all statements contained hereto are true, correct, and complete.

On this _____ day of _____, 2007

(Legal Name of Offeror) (Date)

(Signature of Authorized Representative) (Date)

(Title)

Form F

CORPORATE CERTIFICATE

Corporations

I, _____, certify that I am the Secretary of the Corporation named as Contractor in the foregoing Bid; that _____, who signed said Bid on behalf of the Contractor was then _____ of said Corporation; that said Bid was duly signed for and on behalf of said Corporation by authority of its Board of Directors, and is within the scope of its corporate powers; that said Corporation is organized under the laws of the State of _____.

This _____ day of _____, 20 ____ .

(SEAL) must be affixed

Partnership or other entities:

I, _____, certify that I am authorized to sign to commit _____ named as Contractor in the foregoing Bid. That said company is formed under the laws of the State of _____.

This _____ day of _____, 20 ____ .

It is necessary to attach a letter on company letterhead and dated on or after the date of this certificate that the individual signing to commit the partnership or other entity not a corporation to the stipulations of this bid is authorized to do so. The letter should be signed by an individual working for the company who has knowledge of this fact.

Form G

DISCLOSURE FORM AND QUESTIONNAIRE

1. Please provide the names and business addresses of each of the Offeror's firm's officers and directors.

For the purposes of this form, the term "Offeror" means an entity that responds to a solicitation for a County contract by either submitting a proposal in response to a Request for Proposal or a Request for Qualification or a Bid in response to an Invitation to Bid. Describe accurately, fully and completely, their respective relationships with said Offeror, including their ownership interests and their anticipated role in the management and operations of said Offeror.

2. Please describe the general development of said Offeror's business during the past five (5) years, or such shorter period of time that said Offeror has been in business.
3. Please state whether any employee, agent or representative of said Offeror who is or will be directly involved in the subject project has or had within the last five (5) years: (i) directly or indirectly had a business relationship with Fulton County; (ii) directly or indirectly received revenues from Fulton County; or (iii) directly or indirectly receives revenues from the result of conducting business on Fulton County property or pursuant to any contract with Fulton County. Please describe in detail any such relationship.

LITIGATION DISCLOSURE:

Failure to fully and truthfully disclose the information required, may result in the disqualification of your bid or proposal from consideration or termination of the Contract, once awarded.

1. Please state whether any of the following events have occurred in the last five (5) years with respect to said Offeror. If any answer is yes, explain fully the following:
 - (a) whether a petition under the federal bankruptcy laws or state insolvency laws was filed by or against said Offeror, or a receiver fiscal agent or similar officer was appointed by a court for the business or property of said Offeror;
 - (b) whether Offeror was subject of any order, judgment, or decree not subsequently reversed, suspended or vacated by any court of competent jurisdiction, permanently enjoining said Offeror from engaging in any type of business practice, or otherwise eliminating any type of business practice; and
 - (c) whether said Offeror's business was the subject of any civil or criminal proceeding in which there was a final adjudication adverse to said Offeror, which directly arose from activities conducted by the business unit or corporate division of said Offeror which submitted a bid or proposal for the subject project. If so please explain.
2. Have you or any member of your firm or team to be assigned to this engagement ever been indicted or convicted of a criminal offense within the last five (5) years?

Circle One: YES NO

3. Have you or any member of your firm or team been terminated (for cause or otherwise) from any work being performed for Fulton County or any other Federal, State or Local Government ?

Circle One: YES NO

4. Have you or any member of your firm or team been involved in any claim or litigation adverse to Fulton County or any other federal, state or local government, or private entity during the last three (3) years?

Circle One: YES NO

5. Has any offeror, member of offeror's team, or officer of any of them (with respect to any matter involving the business practices or activities of his or her employer), been notified within the five (5) years preceding the date of this offer that any of them are the target of a criminal investigation, grand jury investigation, or civil enforcement proceeding?

Circle One: YES NO

If you have answered "YES" to any of the above questions, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, the name of the court and the file or reference number of the case, as applicable. Any such information should be provided on a separate page, attached to this form and submitted with your proposal.

NOTE: If any response to any question set forth in this questionnaire has been disclosed in any other document, a response may be made by attaching a copy of such disclosure. (For example, said Offeror's most recent filings with the Securities and Exchange Commission ("SEC") may be provided if they are responsive to certain items within the questionnaire.) However, for purposes of clarity, Offeror should correlate its responses with the exhibits by identifying the exhibit and its relevant text.

Disclosures must specifically address, completely respond and comply with all information requested and fully answer all questions requested by Fulton County. Such disclosure must be submitted at the time of the bid or proposal submission and included as a part of the bid/proposal submitted for this project. Disclosure is required for Offerors, joint venture partners and first-tier subcontractors.

Failure to provide required disclosure, submit officially signed and notarized documents or respond to any and all information requested/required by Fulton County can result in the bid/proposal declared as non-responsive. This document must be completed and included as a part of the bid/proposal package along with other required documents.

[SIGNATURES ON NEXT PAGE]

Under penalty of perjury, I declare that I have examined this questionnaire and all attachments hereto, if applicable, to the best of my knowledge and belief, and all statements contained hereto are true, correct, and complete.

On this _____ day of _____, 2007

(Legal Name of Proponent) (Date)

(Signature of Authorized Representative) (Date)

(Title)

Sworn to and subscribed before me,

this _____ day of _____, 2007

(Notary Public) (Seal)

Commission Expires _____
(Date)

END OF SECTION NO. 3

SECTION 4

BID BOND REQUIREMENTS

No bid for a contract in Fulton County for work to be done shall be valid for any purpose unless the Contractor shall give a Bid Bond with good and sufficient surety payable to, in favor of, and for the protection of Fulton County. The Bid Bond shall be in the amount of not less than 5% of the total amount payable by the terms of the Contract. No bid shall be read aloud or considered if a proper bid bond has not been submitted.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

BID BOND**W035- RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT
FULTON COUNTY GOVERNMENT**

KNOW ALL MEN BY THESE PRESENTS, THAT WE _____

hereinafter called the PRINCIPAL, and _____

hereinafter call the SURETY, a corporation chartered and existing under the laws of the State of _____ and duly authorized to transact Surety business in the State of Georgia, are held and firmly bound unto the Fulton County Government, in the penal sum of _____ Dollars and Cents (\$ _____)

good and lawful money of the United States of America, to be paid upon demand of the Fulton County Government, to which payment well and truly to be made we bind ourselves, our heirs, executors, and administrators and assigns, jointly and severally and firmly by these presents.

WHEREAS the PRINCIPAL has submitted to the Fulton County Government, for W035- RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT, a Bid;

WHEREAS the PRINCIPAL desires to file this Bond in accordance with law:

NOW THEREFORE: The conditions of this obligation are such that if the Bid be accepted, the PRINCIPAL shall within ten (10) calendar days after receipt of written notification from the COUNTY of the award of the Contract execute a Contract in accordance with the Bid and upon the terms, conditions and prices set forth therein, in the form and manner required by the Fulton County Government, and execute sufficient and satisfactory Performance and Payments Bonds payable to the Fulton County Government, each in the amount of one hundred (100%) percent of the total contract price in form and with security satisfactory to said Fulton County Government, then this obligation to be void; otherwise, to be and remain in full force and virtue in law; and the SURETY shall upon failure of the PRINCIPAL to comply with any or all of the foregoing requirements within the time specified above immediately pay to the Fulton County Government, upon demand the amount hereof in good and lawful money of the United States of America, not as a penalty but as liquidated damages.

In the event suit is brought upon this Bond by the COUNTY and judgment is recovered, the SURETY shall pay all costs incurred by the COUNTY in such suit, including attorney's fees to be fixed by the Court.

Enclosed is a Bid Bond in the approved form, in the amount of

_____Dollars

(\$_____) being in the amount of five (5%) percent of the CONTRACT Sum. The money payable on this bond shall be paid to the Fulton County Government, for the failure of the Bidder to execute a CONTRACT within ten (10) days after receipt of the Contract form and at the same time furnish a Payment Bond and Performance Bond.

IN TESTIMONY THEROF, the PRINCIPAL and SURETY have caused these presents to be duly signed and sealed this _____ day of _____, 2007.

(Signatures on next page)

ATTEST:

PRINCIPAL

BY _____

(SEAL)

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as principal in the within bond; that _____

_____,

Who signed the said bond of said corporation; that I know this signature, and his/her signature thereto is genuine; and that said bond was duly signed, sealed and attested for in behalf of said Corporation by authority of its governing body.

SECRETARY

(CORPORATE SEAL)

SURETY

(SEAL)

BY _____

END OF SECTION NO. 4

SECTION 5

CONTRACT COMPLIANCE REQUIREMENTS

NON-DISCRIMINATION IN CONTRACTING AND PROCUREMENT

Policy Statement: It is the policy of Fulton County Government that discrimination against businesses by reason of the race, color, gender or national origin of the ownership of any such business is prohibited. Furthermore, it is the policy of the Board of Commissioners ("Board") that Fulton County and all vendors and contractors doing business with Fulton County shall provide to all businesses the opportunity to participate in contracting and procurement paid, in whole or in part, with monetary appropriations of the Board. Similarly, it is the policy of the Board that the contracting and procurement practices of Fulton County should not implicate Fulton County as either an active or passive participant in the discriminatory practices engaged in by private contractors seeking to obtain contracts with Fulton County.

Equal Business Opportunity Plan (EBO Plan): In addition to the proposal submission requirements, each vendor **must** submit an Equal Business Opportunity Plan (EBO Plan) with their bid/proposal. The EBO Plan is designed to enhance the utilization of a particular racial, gender or ethnic group by a bidder/proposer, contractor, or vendor or by Fulton County. The respondent **must** outline a plan of action to encourage and achieve diversity and equality in the available procurement and contracting opportunities with *this solicitation*.

The EBO Plan **must** identify and include:

1. Potential opportunities within the scope of work of *this solicitation* that will allow for participation of racial, gender or ethnic groups.
2. Efforts that will be made by the bidder/proposer to encourage and solicit minority and female business utilization in this solicitation.

Fulton County encourages joint ventures, teaming, partnering and mentor-protégé relationships with minority and female businesses in an effort to achieve contracting and procurement diversity.

Prompt Payment: The prime contractor **must** certify in writing and **must** document on the Exhibit G Form (Prime Contractor/Subcontractor Utilization Report) that all subcontractors, sub-consultants and suppliers have been promptly paid for work and materials, (less any retainage by the prime contractor prior to receipt of any further progress payments). In the event the prime contractor is unable to pay subcontractors, sub-consultants or suppliers until it has received a progress payment from Fulton County, the prime contractor shall pay all subcontractors, sub-consultants or suppliers funds due from said progress payments within forty-eight (48) hours of receipt of payment from Fulton County. In no event shall a subcontractor, sub-consultant or supplier be paid later than fifteen (15) days as provided for by state law.

REQUIRED FORMS AND EBO PLAN:

In order to be compliant with the intent and provisions of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance (99-0960), bidders/proposers **must** submit the following completed documents. Failure to provide this information **shall** result in the bid/proposal being deemed non-responsive:

- **Exhibit A** - Promise of Non-Discrimination
- **Exhibit B** - Employment Report
- **Exhibit C** - Schedule of Intended Subcontractor Utilization
- **Exhibit D** - Letter of Intent to Perform As a Subcontractor or Provide Materials or Services
- **Exhibit E** - Declaration Regarding Subcontractor Practices
- **Exhibit F** - Joint Venture Disclosure Affidavit
- **Equal Business Opportunity Plan (EBO Plan)** – This document is not a form. It is a statement created by the bidder/proposer on its company letter head addressing the EBO Plan requirements.

All Contract Compliance documents (Exhibits A – F and EBO Plan) are to be placed in a **separate sealed envelope** clearly marked "Contract Compliance". The EBO Plan must be submitted on company letterhead. These documents are considered part of and should be submitted with the Technical Proposal.

The following document **must** be completed as instructed if awarded the bid:

- **Exhibit G** - Prime Contractor's Subcontractor Utilization Report

EXHIBIT A – PROMISE OF NON-DISCRIMINATION

"Know all persons by these presents, that I/WE (_____),
Name

Title Firm Name

Hereinafter "Company"), in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, hereby consent, covenant and agree as follows:

- 1) No person shall be excluded from participation in, denied the benefit of, or otherwise discriminated against on the basis of race, color, national origin or gender in connection with any bid submitted to Fulton County for the performance of any resulting there from,
- 2) That it is and shall be the policy of this Company to provide equal opportunity to all businesses seeking to contract or otherwise interested in contracting with this Company without regard to the race, color, gender or national origin of the ownership of this business,
- 3) That the promises of non-discrimination as made and set forth herein shall be continuing in nature and shall remain in full force and effect without interruption,
- 4) That the promise of non-discrimination as made and set forth herein shall be made a part of, and incorporated by reference into, any contract or portion thereof which this Company may hereafter obtain,
- 5) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth herein shall constitute a material breach of contract entitling the Board to declare the contract in default and to exercise any and all applicable rights and remedies, including but not limited to cancellation of the contract, termination of the contract, suspension and debarment from future contracting opportunities, and withholding and/or forfeiture of compensation due and owing on a contract; and
- 6) That the bidder shall provide such information as may be required by the Director of Contract Compliance pursuant to Section 4.4 of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance.

SIGNATURE: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

EXHIBIT B – EMPLOYMENT REPORT

The demographic employment make-up for the bidder **must** be identified and submitted with this bid/proposal. In addition, if subcontractors will be utilized by the bidder/proposer to complete this project, then the demographic employment make-up of the subcontractor(s) must be identified and submitted with this bid.

EMPLOYEES

CATEGORY	NATIVE INDIAN		AFRICAN AMERICAN		ASIAN AMERICAN		HISPANIC AMERICAN		CACUSIAN AMERICAN		OTHER	
Male/Female	M	F	M	F	M	F	M	F	M	F	M	F
Mgmt/Official												
Professional (Arch., P.E., etc.)												
Supervisors												
Office/ Clerical												
Craftsmen												
Laborers												
Others (Specify)												
TOTALS												

FIRM'S NAME: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

This completed form is for (Check one) _____ Bidder/Proposer _____ Subcontractor

Submitted by: _____ Date Completed: _____

EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

If the bidder/proposer intends to subcontract any portion of this scope of work/service(s), this form **must be** completed and **submitted with the bid/proposal**. All prime bidders/proposers **must** include Letter(s) of Intent (Exhibit D) in the bid document for all subcontractors who will be utilized under the scope of work/services.

Prime Bidder/Proposer: _____

ITB/RFP NUMBER: _____

Project Name or Description of Work/Service(s): _____

1. My firm, as Prime Bidder/Proposer on this scope of work/service(s) is _____ is not _____ a minority or female owned and controlled business. (Please indicate below the portion of work, including, percentage of bid amount that your firm will carry out directly):

If the Prime Bidder/Proposer is a Joint Venture, please complete Exhibit F: Joint Venture Disclosure Affidavit and attach a copy of the executed Joint Venture Agreement.

2. Sub-Contractors (Including suppliers) to be utilized in the performance of this scope of work/service(s), if awarded, are:

SUBCONTRACTOR NAME: _____

ADDRESS: _____

PHONE: _____

CONTACT PERSON: _____

ETHNIC GROUP*: _____ **COUNTY CERTIFIED**** _____

WORK TO BE PERFORMED: _____

DOLLAR VALUE OF WORK: \$ _____ **PERCENTAGE VALUE:** _____ %

Ethnic Groups:** African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); *If yes, attach copy of recent certification letter.**

EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

SUBCONTRACTOR NAME: _____

ADDRESS: _____

PHONE: _____

CONTACT PERSON: _____

ETHNIC GROUP*: _____ COUNTY CERTIFIED** _____

WORK TO BE PERFORMED: _____

DOLLAR VALUE OF WORK: \$ _____ PERCENTAGE VALUE: _____ %

SUBCONTRACTOR NAME: _____

ADDRESS: _____

PHONE: _____

CONTACT PERSON: _____

ETHNIC GROUP*: _____ COUNTY CERTIFIED** _____

WORK TO BE PERFORMED: _____

DOLLAR VALUE OF WORK: \$ _____ PERCENTAGE VALUE: _____ %

SUBCONTRACTOR NAME: _____

ADDRESS: _____

PHONE: _____

CONTACT PERSON: _____

ETHNIC GROUP*: _____ COUNTY CERTIFIED** _____

WORK TO BE PERFORMED: _____

DOLLAR VALUE OF WORK: \$ _____ PERCENTAGE VALUE: _____ %

SUBCONTRACTOR NAME: _____

ADDRESS: _____

PHONE: _____

CONTACT PERSON: _____

ETHNIC GROUP*: _____ COUNTY CERTIFIED** _____

WORK TO BE PERFORMED: _____

DOLLAR VALUE OF WORK: \$ _____ PERCENTAGE VALUE: _____ %

***Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); **If yes, attach copy of recent certification letter.**

EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION

Total Dollar Value of Subcontractor Agreements: (\$)

Total Percentage Value: (%)

CERTIFICATION: The undersigned certifies that he/she has read, understands and agrees to be bound by the Bid provisions, including the accompanying Exhibits and other terms and conditions regarding subcontractor utilization. The undersigned further certifies that he/she is legally authorized by the Bidder to make the statement and representation in this Exhibit and that said statements and representations are true and correct to the best of his/her knowledge and belief. The undersigned understands and agrees that if any of the statements and representations are made by the Bidder knowing them to be false, or if there is a failure of the intentions, objectives and commitments set forth herein without prior approval of the County, then in any such event the Contractor's acts or failure to act, as the case may be, shall constitute a material breach of the contract, entitling the County to terminate the Contract for default. The right to so terminate shall be in addition to, and in lieu of, any other rights and remedies the County may have for other defaults under the contract.

Signature/Title: _____

Firm or Corporate Name: _____

Address: _____

Telephone: () _____

Fax Number: () _____

Email Address: _____

EXHIBIT D

**LETTER OF INTENT TO PERFORM AS A SUBCONTRACTOR
OR
PROVIDE MATERIALS OR SERVICES**

This form **must** be completed by **ALL** known subcontractors/suppliers and submitted with the bid. The Prime Contractor **must** submit Letters of Intent for ALL known subcontractors/suppliers at time of bid submission.

To: _____
(Name of Prime Contractor Firm)

From: _____
(Name of Subcontractor Firm)

ITB/RFP Number: _____

Project Name:_____

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project (specify in detail particular work items, materials, or services to be performed or provided):

[illegible]

(Prime Bidder)

(Subcontractor)

Signature_____Signature_____

Title	Title
-------	-------

Date _____ Date _____

EXHIBIT E – DECLARATION REGARDING SUBCONTRACTING PRACTICES

If the bidder/proposer **does not intend to subcontract** any portion of the scope of work services(s), this form **must be** completed and submitted with the bid.

_____ Hereby declares that it is my/our intent to
(Bidder)

Perform 100% of the work required for _____
(IFB/RFP Number)

(Description of Work)

In making this declaration, the bidder/proposer states the following:

1. That the bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform **all elements** of the work on this project with his/her own current work forces;
2. If it should become necessary to subcontract some portion of the work at a later date, the bidder will comply with all requirements of the County's Non-Discrimination Ordinance in providing equal opportunities to all firms to subcontract the work. The determination to subcontract some portion of the work at a later date shall be made in good faith and the County reserves the right to require additional information to substantiate a bidder's decision to subcontract work following the award of the contract. Nothing contained in this provision shall be employed to circumvent the spirit and intent of the County's Non-Discrimination Ordinances;
3. The bidder will provide, upon request, information sufficient for the County to verify Item Number one.

AUTHORIZED COMPANY REPRESENTATIVE

Name: _____ Title: _____ Date: _____

Signature: _____

Firm: _____

Address: _____

Phone Number: _____

Fax Number: _____

Email Address: _____

EXHIBIT F – JOINT VENTURE DISCLOSURE AFFIDAVIT**IFB No.** _____**Project Name** _____

This form must be completed and submitted with the bid if a Joint Venture approach is to be undertaken.

The firms listed below do hereby declare that they have entered into a joint venture agreement pursuant to the above mentioned project. The information requested below is to clearly identify and explain the extent of participation of each firm in the proposed joint venture. All items must be properly addressed before the business entity can be evaluated.

1. Firms:

1) Name of Business: _____
Street Address: _____
City/State/Zip: _____
County: _____
Nature of Business: _____

2) Name of Business: _____
Street Address: _____
City/State/Zip: _____
County: _____
Nature of Business: _____

3) Name of Business: _____
Street Address: _____
City/State/Zip: _____
County: _____
Nature of Business: _____

NAME OF JOINT VENTURE (If applicable): _____**OFFICE ADDRESS:** _____**PRINCIPAL OFFICE:** _____**OFFICE PHONE:** _____

EXHIBIT F – JOINT VENTURE DISCLOSURE AFFIDAVIT

Note: Attach additional sheets as required

1. Describe the capital contributions by each joint venturer and accounting thereof. Indicate the percentage make-up for each joint venture partner.
2. Describe the financial controls of the joint venture, e.g., will a separate cost center be established? Which venturer will be responsible for keeping the books? How will the expense therefore be reimbursed? What is the authority of each joint venture to commit or obligate the order?
3. Describe any Ownership, options for Ownership, or loans between the joint ventures. Identify terms thereof.
4. Describe the estimate contract cash flow for each joint venturer.
5. To what extent and by whom will the on-site work be supervised?
6. To what extent and by whom will the administrative office be supervised?
7. Which joint venturer will be responsible for material purchases including the estimated cost thereof? How will the purchase be financed?
8. Which joint venturer will provide equipment? What is the estimated cost thereof? How will the equipment be financed?
9. Describe the experience and business qualifications of each joint venturer.
10. Submit a copy of all joint venture agreements and evidence of authority to do business in the State of Georgia as well as locally, to include all necessary business licenses.
11. Percent of ownership by each joint venture in terms of profit and loss sharing: _____

12. The authority of each joint venturer to commit or obligate the other: _____

13. Number of personnel to be involved in project, their crafts and positions and whether they are employees of the small business enterprise, the majority firm or the joint venture: _____

EXHIBIT F – JOINT VENTURE DISCLOSURE AFFIDAVIT

14. Identification of control and participation in venture; list those individuals who are responsible for day-to-day management and policy decision-maker, including, but not limited to, those with prime responsibility for areas designated below; (use additional sheets if necessary)

<u>Name</u>	<u>Race</u>	<u>Sex</u>	<u>Financial Decisions</u>	<u>Supervision Field Operation</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

In connection with any work that these firms, as a joint venture, might be authorized to perform in connection with above captioned contract, we each do hereby authorize representatives of the Fulton County Department of Purchasing and Contract Compliance and Departments of Finance, under the direction of the County Manger's Office, to examine, from time to time, the books, records and files to the extent that such relate to this County project.

WE DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THE FOREGOING DOCUMENT ARE TRUE AND CORRECT, AND THAT WE ARE AUTHORIZED, ON BEHALF OF THE ABOVE FIRMS, TO MAKE THIS AFFIDAVIT AND GRANT THE ABOVE PRIVILEGE.

FOR: _____
(Company)

Date: _____
(Signature of Affiant)

(Printed Name)

(Company)

Date: _____
(Signature of Affiant)

(Printed Name)

State of _____:

County of _____:

On this _____ day of _____, 20_____, before me, appeared

_____, the undersigned known to me to be the person described in the foregoing Affidavit and acknowledge that he (she) executed the same in the capacity therein stated and for the purpose therein contained.

EXHIBIT G – PRIME CONTRACTOR/SUBCONTRACTOR UTILIZATION REPORT

This report is required to be submitted by the tenth day of each month, with a copy of your payment invoice (schedule of values/payment application) to Contract Compliance. Failure to comply may result in the County commencing proceedings to impose sanctions on the successful bidder, in addition to purchasing any other available legal remedy. Sanctions may include the suspending of any payment or part thereof, termination or cancellation of the contract, and the denial to participate in any future contracts awarded by Fulton County.

REPORTING PERIOD		PROJECT NAME:	
FROM:		PROJECT NUMBER:	
TO:		PROJECT LOCATION:	

PRIME CONTRACTOR		Contract Award Date	Contract Award Amount	Change Order Amount
Name:				
Address:				
Telephone #:				

AMOUNT OF REQUISITION THIS PERIOD:\$ _____
TOTAL AMOUNT REQUISITION TO DATE:\$ _____

SUBCONTRACTOR UTILIZATION (add additional rows as necessary)

Name of Sub-contractor	Description of Work	Contract Amount	Amount Paid To Date	Amount Requisition This Period
TOTALS				

Executed By: _____

(Signature)
Name)

(Printed

END OF SECTION NO. 5

SECTION 6

INSURANCE AND RISK MANAGEMENT PROVISIONS

This section should contain the appropriate insurance information, forms and requirements for this project.

Insurance and Risk Management Provisions Construction

It is Fulton County Government's practice to obtain Certificates of Insurance from our Contractors and Vendors. Insurance must be written by a licensed agent in a company licensed to write insurance in the State of Georgia, with an A.M. Best rating of at least A- VI, subject to final approval by Fulton County. Respondents shall submit with the bid/proposal evidence of insurability satisfactory to Fulton County Government as to form and content. Either of the following forms of evidence is acceptable:

- A **letter from an insurance carrier** stating that upon your firm/company being the successful Bidder/Respondent that a Certificate of Insurance shall be issued in compliance with the Insurance and Risk Management Provisions outlined below.
- A **Certificate of Insurance** complying with the Insurance and Risk Management Provisions outlined below (Request for Bid/Proposal number and Project Name, Number and Description must appear on the Certificate of Insurance).

Upon award, the Contractor/Vendor must maintain at their expense, insurance with policy limits equal to or greater than the limits described below. Any and all Insurance Coverage(s) and Bonds required under the terms and conditions of the contract shall be maintained during the entire length of the contract, including any extensions or renewals thereto, and until all work has been completed to the satisfaction of Fulton County Government.

Accordingly the Respondent shall provide a certificate evidencing the following:

1. WORKERS COMPENSATION/EMPLOYER'S LIABILITY INSURANCE – STATUTORY (In compliance with the Georgia Workers Compensation Acts and any other State or Federal Acts or Provisions in which jurisdiction may be granted)

Employer's Liability Insurance	BY ACCIDENT	EACH ACCIDENT	\$1,000,000
Employer's Liability Insurance	BY DISEASE	POLICY LIMIT	\$1,000,000
(Aggregate)	BY DISEASE	EACH EMPLOYEE	\$1,000,000

2. COMMERCIAL GENERAL LIABILITY INSURANCE (Including contractual Liability Insurance)

Bodily Injury and Property Damage Liability	Each Occurrence	\$1,000,000
(Other than Products/Completed Operations)	General Aggregate	\$2,000,000
Products\Completed Operation	Aggregate Limit	\$2,000,000
Personal and Advertising Injury	Limits	\$1,000,000
Fire Damage	Limits	\$100,000

3. BUSINESS AUTOMOBILE LIABILITY INSURANCE

Combined Single Limits	Each Occurrence	\$1,000,000
(Including operation of non-owned, owned, and hired automobiles).		

4. ELECTRONIC DATA PROCESSING LIABILITY

(Required if computer contractor)	Limits	\$1,000,000
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5. UMBRELLA LIABILITY

(In excess of above noted coverages)	Each Occurrence	\$10,000,000
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6. PROFESSIONAL LIABILITY

Each Occurrence \$5,000,000

(To be provided when the Contract includes specified Professional Services, and will be written with all Environmental/Pollution exclusions deleted).

7. ENVIRONMENTAL/POLLUTION LIABILITY

Each Occurrence \$2,000,000

8. FIDELITY BOND

(Employee Dishonesty) Each Occurrence \$ 100,000

9. BUILDERS RISK: "All-risk" form of builder's risk insurance providing coverage against loss or damage by fire or other peril on an "all-risk" form, including demolition and increased cost of construction, debris removal and the full replacement cost of the Project foundations and containing an agreed amount endorsement, and, until Final Completion and Acceptance of the Project. Such policy of insurance shall contain at least the following sub-limits of insurance and deductibles:

Sub-limits:

Property in Transit	\$1,000,000
Property in Offsite Storage	\$1,000,000
Plans & Blueprints	\$25,000
Debris Removal	25% of Insured Physical Loss
Delay in Completion / Soft Cost	TBD

Deductibles:

Flood and Earthquake	\$25,000
Water Damage other than Flood	\$100,000
All other Perils	\$10,000

Owner and Contractor waive all rights against each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section, or other property insurance applicable to the Work, accept such rights as they have to the proceeds of such insurance.

The policy will name Fulton County, The Contractor and Subcontractors of all tiers as Insureds under the policy.

Certificates of Insurance

Certificates shall state that the policy or policies shall not expire, be cancelled or altered without at least forty-five (45) days prior written notice to Fulton County Government. Policies and Certificates of Insurance are to list Fulton County Government as an Additional Insured (except for Workers' Compensation) and shall conform to all terms and conditions (including coverage of the indemnification and hold harmless agreement) contained in the Insurance and Risk Management Provisions. The General Liability Additional Insured language should apply to on-going and completed-operations, using ISO form CG 2010 (11/85 version) or equivalent.

If Fulton County Government shall so request, the Respondent, Contractor or Vendor will furnish the County for its inspection and approval such policies of insurance with all endorsements, or confirmed specimens thereof certified by the insurance company to be true and correct copies.

Such certificates and notices **must** identify the "Certificate Holder" as follows:

Fulton County Government – Purchasing Department
130 Peachtree Street, S.W.
Suite 1168
Atlanta, Georgia 30303-3459

Certificates **must** list Project Name and Project Number.

It is understood that **Insurance in no way Limits the Liability of the Contractor/Vendor.**

USE OF PREMISES

Contractor shall confine its apparatus, the storage of materials and the operations of its workers to limits/requirements indicated by law, ordinance, permits and any restrictions of Fulton County Government and shall not unreasonably encumber the premises with its materials.

PROTECTION OF PROPERTY

Contractor will adequately protect its own work from damage, will protect Fulton County Government's property from damage or loss and will take all necessary precautions during the progress of the work to protect all persons and the property of others from damage or loss.

Contractor shall take all necessary precautions for the safety of employees of the work and shall comply with all applicable provisions of the Federal, State and local safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where work is being performed.

Contractor shall erect and properly maintain at all times as required by the conditions and progress of the work, all necessary safeguards for the protection of its employees, Fulton County Government employees and the public and shall post all applicable signage and other warning devices to protect against potential hazards for the work being performed.

INDEMNIFICATION AND HOLD HARMLESS AGREEMENT

Contractor/Vendor hereby agrees to release, indemnify, defend and hold harmless Fulton County, its Commissioners, officers, employees, subcontractors, successors, assigns and agents, from and against any and all losses (including death), claims, damages, liabilities, costs and expenses (including but not limited to all actions, proceedings, or investigations in respect thereof and any costs of judgments, settlements, court costs, attorney's fees or expenses, regardless of the outcome of any such action, proceeding, or investigation), caused by, relating to, based upon or arising out of any act or omission by Contractor/Vendor, its directors, officers, employees, subcontractors, successors, assigns or agents, or otherwise in connection (directly or indirectly) with its acceptance, or the performance, or nonperformance, of its obligations under these agreements. Such obligations shall not be construed to negate, abridge or otherwise reduce any other rights or obligations of indemnity which would otherwise exist as to any party or person as set forth in this paragraph.

Contractor/Vendor's obligation to protect, defend, indemnify and hold harmless, as set forth hereinabove, shall also include, but is not limited to, any matter arising out of any actual or alleged infringement of any patent, trademark, copyright, or service mark, or other actual or alleged unfair competition disparagement of product or service, or other tort or any type whatsoever, or any actual or alleged violation of trade regulations.

Contractor/Vendor further agrees to protect, defend, indemnify and hold harmless Fulton County, its Commissioners, officers, employees, subcontractors, successors, assigns and agents from and against any and all claims or liability for compensation under the Worker's Compensation Act, Disability Benefits Act, or any other employee benefits act arising out of injuries sustained by any employees of Contractor/Vendor. These indemnities shall not be limited by reason of the listing of any insurance coverage.

If the bid/quotation involves construction services Contractor/Vendor will be responsible fully for any and all damage to the work during the course of construction, until the point of Final acceptance by Fulton County.

FULTON COUNTY ACKNOWLEDGES THAT ALL PROVISIONS OF THIS INDEMNITY AGREEMENT MAY NOT BE APPLICABLE TO THE CONTRACTOR/VENDOR'S BUSINESS. TO THE EXTENT THAT CONTRACTOR/VENDOR MAY DEMONSTRATE SUCH NONAPPLICABILITY, FULTON COUNTY MAY NEGOTIATE AMENDMENTS TO THIS AGREEMENT AS THE CIRCUMSTANCES DICTATE.

CONTRACTOR/VENDOR ACKNOWLEDGES HAVING READ, UNDERSTANDING, AND AGREEING TO COMPLY WITH THIS INDEMNIFICATION AND HOLD HARMLESS AGREEMENT, AND THE REPRESENTATIVE OF THE CONTRACTOR/VENDOR IDENTIFIED BELOW IS AUTHORIZED TO SIGN CONTRACTS ON BEHALF OF THE RESPONDING CONTRACTOR/VENDOR.

COMPANY: _____

SIGNATURE: _____

NAME: _____

TITLE: _____

DATE: _____

**SECTION 7
CONTRACTUAL AGREEMENT**

W035- RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT

Contractor: _____ Project No. _____

Address: _____ Telephone: _____

Contact: _____ Facsimile: _____

THIS AGREEMENT is effective as of the _____ day of _____, 2007, by and between Fulton County, a political subdivision of the State of Georgia (hereinafter called the "County"), and the above named CONTRACTOR in accordance with all provisions of this Construction agreement, consisting of the following Contract Documents:

General Conditions
Special Conditions
Bid Form
Quantities and Pricing
Scope of Work and Technical Specifications
Drawings and Specifications
Exhibits
Insurance Forms
Purchasing Forms
Office of Contract Compliance Forms

WITNESSETH: That the said Contractor has agreed, and by these presents does agree with the said County, for an in consideration of a Contract Price of _____ (\$_____) and other good and valuable consideration, and under the penalty expressed on Bonds hereto attached, to furnish all equipment, tools, materials, skill, and labor of every description necessary to carry out and complete in good, firm, and substantial, and workmanlike manner, the Work specified, in strict conformity with the Drawings and the Specifications hereinafter set forth, which Drawings and Specifications together with the bid submittals made by the Contractor, General Conditions, Special Provisions, Detailed Specifications, Exhibits, and this Agreement, shall all form essential parts of this Contract. The Work covered by this Contract includes all Work indicated on Plans and Specifications and listed in the Bid entitled:

Project Number: W035

RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT

The Contractor shall commence the Work with adequate force and equipment within 10 days from receipt of Notice to Proceed from the County, and shall complete the work within **365 consecutive calendar** days from the Notice to Proceed or the date work begins, whichever comes first. The Contractor shall remain responsible for performing, in accordance with the terms of the contract, all work assigned prior to the expiration of the said calendar days allowed for completion of the work even if the work is not completed until after the expiration of such days.

For each calendar day that any work remains uncompleted after the time allowed for completion of the work, the Contractor shall pay the County the sum of \$ 500.00 not as a penalty but as liquidated damages, which liquidated damages the County may deduct from any money due the contractor. At the County's convenience and not to it prejudice the County may provide written notice of the commencement of the assessment of liquidated damages.

As full compensation for the faithful performance of this Contract, the County shall pay the Contractor in accordance with the General Conditions and the prices stipulated in the Bid, hereto attached.

It is further mutually agreed between the parties hereto that if, at any time after the execution of this Agreement and the Surety Bonds hereto attached for its faithful performance, the County shall deem the surety or sureties upon such bonds to be unsatisfactory, or, if, for any reason, such bonds cease to be adequate to cover the performance of the Work, the Contractor shall, at his expense, within five days after receipt of notice from the County so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the County. In such event no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the County.

The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Contractor's agents, servants, and employees, and in addition thereto, for any and all damages to property caused by or resulting from or arising out of any act or omission in connection with this contract or the prosecution of work hereunder, whether caused by the Contractor or the Contractor's agents, Servants, or employees, or by any of the Contractor's subcontractors or suppliers, and the Contractor shall indemnify and hold harmless the County, the Construction Manager, or any of their subcontractors from and against any and all loss and/or expense which they or any of them may suffer or pay as a result of claims or suits due to, because of, or arising out of any and all such injuries, deaths and/or damage, irrespective of County or Construction Manager negligence (except that no party shall be indemnified for their own sole negligence). The Contractor, if requested, shall assume and defend at the Contractor's own expense, any suit, action or other legal proceedings arising there from, and the Contractor hereby agrees to satisfy, pay, and cause to be discharged of record any judgment which may be rendered against the County and the Construction Manager arising there from.

In the event of any such loss, expense, damage, or injury, or if any claim or demand for damages as heretofore set forth is made against the County or the Construction Manager, the County may withhold from any payment due or thereafter to become due to the Contractor under the terms of this Contract, an amount sufficient in its judgment to protect and indemnify it and the Construction Manager from any and all claims, expense, loss, damages, or injury; and the County, in its discretion, may require the Contractor to furnish a surety bond satisfactory to the County providing for such protection and indemnity, which bond shall be furnished by the Contractor within five (5) days after written demand has been made therefore. The expense of said Bond shall be borne by the Contractor. **[See General Conditions for similar provisions]**

This Contract constitutes the full agreement between the parties, and the Contractor shall not sublet, assign, transfer, pledge, convey, sell or otherwise dispose of the whole or any part of this Contract or his right, title, or interest therein to any person, firm or corporation without the previous consent of the County in writing. Subject to applicable provisions of law, this Contract shall be in full force and effect as a Contract, from the date on which a fully executed and approved counterpart hereof is delivered to the Contractor and shall remain and continue in full force and effect until after the expiration of any guarantee period and the Contractor and his sureties are finally released by the County.

This agreement was approved by the Fulton County Board of Commissioner on [Insert approval date and item number].

[SIGNATURES NEXT PAGE]

Attest:

NAME OF CONTRACTOR

By: _____

Title: _____

Seal (Affix)

Attest:

FULTON COUNTY, GEORGIA

By: _____
Mark Massey, Clerk to the Commission

By: _____
Karen Handel, Chair
Board of Commissioners

APPROVED AS TO FORM:

APPROVED AS TO CONTENT:

By: _____
County Attorney

By: _____
Assistant Director of Public Works

END OF SECTION NO. 7

SECTION 8A

PERFORMANCE BOND REQUIREMENTS

No contract with Fulton County for work to be done shall be valid for any purpose unless the Contractor shall give a Performance Bond with good and sufficient surety payable to, in favor of and for the protection of Fulton County. The Performance Bond shall be in the amount of at 100% of the total contract amount payable by the terms of the Contract and shall be written on the enclosed form.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business as a surety in Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that _____
(hereinafter called the "Principal") and _____ (insert name of Contractor)
(insert name of Surety)
"Surety"), are held and firmly bound unto **FULTON COUNTY**, a political subdivision of the State of Georgia (hereinafter called the "Owner"), its successors and assigns, in the penal sum of _____ (100% of Contract amount), lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as the RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT PROJECT, as more particularly described in the Contract (hereinafter called the "Project");

NOW, THEREFORE, the conditions of this obligation are as follows, that if the Principal shall fully and completely perform all the undertakings, covenants, terms, conditions, warranties, and guarantees contained in the Contract, including all modifications, amendments, changes, deletions, additions, and alterations thereto that may hereafter be made, then this obligation shall be void; otherwise it shall remain in full force and effect.

Whenever the Principal shall be, and declared by the Owner to be, in default under the Construction-Type Contract, the Surety shall promptly remedy the default as follows:

1. Complete the Contract in accordance with its terms and conditions; or, at the sole option of the Owner,
2. Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the Surety and the Owner of the lowest responsible bidder, arrange for a contract between such bidder and Owner and make available as the work progresses (even though there should be a default or succession of defaults under the Contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the penal sum set forth in the first paragraph hereof, as may be adjusted, and the Surety shall make available and pay to the Owner the funds required by this Paragraph prior to the payment of the Owner of the balance of the contract price, or any portion thereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by the Owner to the Contractor under the Contract, and any amendments thereto, less the amount paid by the Owner to the Contractor; or, at the sole option of the Owner,
3. Allow Owner to complete the work and reimburse the Owner for all reasonable costs incurred in completing the work.

In addition to performing as required in the above paragraphs, the Surety shall indemnify and hold harmless the Owner from any and all losses, liability and damages, claims, judgments, liens, costs and fees of every description, including reasonable attorney's fees, litigation costs and expert witness fees, which the Owner may incur, sustain or suffer by reason of the failure or default on the part of the Principal in the performance of any or all of the terms, provisions, and

requirements of the Contract, including any and all amendments and modifications thereto, or incurred by the Owner in making good any such failure of performance on the part of the Principal.

The Surety shall commence performance of its obligations and undertakings under this Bond promptly and without delay, after written notice from the Owner to the Surety.

The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and any other amendments in or about the Contract, and agrees that the obligations undertaken by this Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, change in payment terms, and amendments.

The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment to the Contract, so as to bind the Principal and the Surety to the full and faithful performance of the Contract as so amended or modified, and so as to increase the penal sum to the adjusted Contract Price of the Contract.

No right of action shall accrue on this Bond to or for the use of any person, entity or corporation other than the Owner and any other obligee named herein, or their executors, administrators, successors or assigns.

This Bond is intended to comply with O.C.G.A. Section 36-91-1 et seq., and shall be interpreted so; as to comply with; the minimum requirements thereof. However, in the event the express language of this Bond extends protection to; the Owner beyond that contemplated by O.C.G.A. Section 36-91-1 et seq. and O.C.G.A. Section 13-10-1, as amended, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the Owner, whether or not such protection is found in the applicable statutes.

IN WITNESS WHEREOF the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this _____ day of _____, _____.

_____(SEAL)
(Principal)

By: _____

Attest:

Secretary

_____(SEAL)
(Surety)

By: _____

Attest:

Secretary

(Address of Surety's Home Office)

(Resident Agent of Surety)

END OF SECTION NO. 8A

SECTION 8B

PAYMENT BOND REQUIREMENTS

No Contract with Fulton County for work to be done shall be valid for any purpose unless the Contractor shall give a Payment Bond with good and sufficient surety payable to Fulton County for the use and protection of all sub-contractors and all persons supplying labor, materials, machinery, and equipment in the prosecution of the work provided for in the Contract. The Payment Bond shall be in the amount of 100% of the total contract amount payable by the terms of the Contract and shall be written on the following form.

Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Georgia.

Attestation for the corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that _____
(hereinafter called the "Principal") and _____
(hereinafter called the "Surety"), are held and firmly bound unto **FULTON COUNTY**, a political subdivision of the State of Georgia (hereinafter called the "Owner"), its successors and assigns as obligee, in the penal sum of _____
(100% of Contract amount), lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the Owner, dated _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for construction-type services of a project known as the RIVERSIDE/DOGWOOD WATER MAIN REPLACEMENT PROJECT, as more particularly described in the Contract (hereinafter called the "Project");

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payment to all persons working on or supplying labor or materials under the Contract, and any amendments thereto, with regard to labor or materials furnished and used in the Project, and with regard to labor or materials furnished but not so used, then this obligation shall be void; but otherwise it shall remain in full force and effect.

1. A "Claimant" shall be defined herein as any subcontractor, person, party, partnership, corporation or the entity furnishing labor, services or materials used, or reasonably required for use, in the performance of the Contract, without regard to whether such labor, services or materials were sold, leased or rented, and without regard to whether such Claimant is or is not in privity of contract with the Principal or any subcontractor performing work on the Project, including, but not limited to, the following labor, services, or materials: water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.
2. In the event a Claimant files a lien against the property of the Owner, and the Principal fails or refuses to satisfy or remove it promptly, the Surety shall satisfy or remove the lien promptly upon written notice from the Owner, either by bond or as otherwise provided in the Contract.
3. The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in the payment terms, and any other amendments in or about the Contract and agrees that the obligations undertaken by this Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and amendments.
4. The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment or modifications to the Contract, so as to bind the Principal and Surety, jointly and severally, to the full payment of any Claimant under the Contract, as amended or modified, provided only that the Surety shall not be liable for more than the penal sum of the Bond, as specified in the first paragraph hereof.
5. This Bond is made for the use and benefit of all persons, firms, and corporations who or which may furnish any materials or perform any labor for or on account of the construction-type services to be performed or supplied under the Contract, and any amendments thereto, and they and each of them may sue hereon.
6. No action may be maintained on this Bond after one (1) year from the date the last services, labor, or materials were provided under the Contract by the Claimant prosecuting said action.

7. This Bond is intended to comply with O.C.G.A. Section 13-10-1, and shall be interpreted so as to comply with the minimum requirements thereof. However, in the event the express language of this Bond extends protection to the Owner beyond that contemplated by O.C.G.A. Section 13-10-1, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the Owner, whether or not such protection is found in the applicable statutes.

IN WITNESS WHEREOF the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this day of _____, _____.

_____(SEAL)
(Principal)

By: _____

Attest:

Secretary

_____(SEAL)
(Surety)

By: _____

Attest:

Secretary

(Address of Surety's Home Office)

(Resident Agent of Surety)

END OF SECTION NO. 8B

SECTION 9

GENERAL CONDITIONS

9-1 FAMILIARITY WITH SITE

Execution of this agreement by the Contractor is a representation that the Contractor has visited the site, has become familiar with the local conditions under which the work is to be performed, and has correlated personal observations with the requirements of this agreement.

9-2 CONTRACT DOCUMENTS

This agreement consists of Owner's invitation to bid, instructions to bidders, bid form, performance bond, payment bond, acknowledgments, the contract, general conditions, special conditions, specifications, plans, drawings, exhibits, addenda, and written change orders.

A. Notice of Award of Contract:

B. Execution of Contract Documents

Upon notification of Award of Contract, the Owner shall furnish the Contractor the conformed copies of Contract Documents for execution by the Contractor and the Contractor's surety. Within ten (10) days after receipt the Contractor shall return all the documents properly executed by the Contractor and the Contractor's surety. Attached to each document shall be an original power-of-attorney for the person executing the bonds for the surety and certificates of insurance for the required insurance coverage.

After receipt of the documents executed by the Contractor and his surety with the power-of-attorney and certificates of insurance, the Owner shall complete the execution of the documents. Distribution of the completed documents will be made upon completion.

Should the Contractor and/or Surety fail to execute the documents within the time specified; the Owner shall have the right to proceed on the Bid Bond accompanying the bid.

If the Owner fails to execute the documents within the time limit specified, the Contractor shall have the right to withdraw the Contractor's bid without penalty.

Drawings and Specifications:

The Drawings, Specifications, Contract Documents, and all supplemental documents, are considered essential parts of the Contract, and requirements occurring in one are as binding as though occurring in all. They are intended to define, describe and provide for all Work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the Owner.

In case of conflict between the Drawings and Specifications, the most stringent shall govern.

Figure dimensions on Drawings shall govern over scaled dimensions.

In case of conflict between Detailed Drawings and General Drawings the most stringent shall govern.

In cases where products or quantities are omitted from the Specifications, the description and quantities shown on the Drawings shall govern.

In all of the above cases, ambiguities or need for clarification of the Drawings or Specifications shall be immediately reported to the Construction Manager in writing. Any such ambiguity or need for clarification shall be handled by the Construction Manager in writing. No clarification of the Drawings and Specifications hereunder by the Construction Manager shall entitle the Contractor to any additional monies unless a Change Order has been processed as provided by "Changes in the Contract" hereof.

Any work done by the Contractor following a discovery of such differing site condition or ambiguity or need for clarification in the Contract Drawings and Specifications prior to a written report to the Construction Manager shall not entitle the Contractor to additional monies and shall be done at the Contractor's risk.

The Construction Manager will furnish the Contractor five (5) copies of the Contract Drawings and the Specifications, one copy of which the Contractor shall have available at all times on the Project site.

9-3 DEFINITIONS

The following terms as used in this agreement are defined as follows to the extent the definitions herein differ or conflict with those in the Instructions for Bidders, Section 00100, the definitions herein shall control.

Change Order - A written order to the Contractor issued by the County pursuant to Fulton County Policy and Procedures 800-6 for changes in the work within the general scope of the contract documents, adjustment of the contract price, extension of the contract time, or reservation of determination of a time extension.

Construction Manager or Engineer shall mean Fulton Construction Management Partners, the County authorized representative for this project.

Contractor shall mean the party of the second part to the Contract Agreement or the authorized and legal representative of such party.

Contract Documents include the Contract Agreement, Contractor's Bid (including all documentation accompanying the Bid and any post-Bid documentation required by the County prior to the Notice of Award), Bonds, all Special Conditions, General Conditions, Supplementary Conditions, Specifications, Drawings and addenda, together with written amendments, change orders, field orders and the Construction Manager's written interpretations and clarifications issued in accordance with the General Conditions on or after the date of the Contract Agreement. Shop drawing submittals reviewed in accordance with the General Conditions, geotechnical investigations and soils report and drawings of physical conditions in or relating to existing surface structures at or contiguous to the site are not Contract Documents.

Contract Price - The sum specified in the Agreement to be paid to the Contractor in consideration of the Work.

Contract Time shall mean the number of consecutive calendar days as provided in the Contract Agreement for completion of the Work, to be computed from the date of Notice to Proceed.

Owner or County shall mean Fulton County Government, party of the first part to the Contract Agreement, or its authorized and legal representatives.

Day - A calendar day of twenty-four hours lasting from midnight of one day to midnight the next day.

Design Consultant shall mean the firm or corporation responsible for the detailed design drawings and specifications.

Director - Director of the Department of Public Works of Fulton County, Georgia or the designee thereof.

Final Completion shall mean the completion of all work as required in accordance with the terms and conditions of the contract documents.

Liquidated Damages shall mean the amount, stated in the Contract Agreement, which the Contractor agrees to pay to the Owner for each consecutive calendar day beyond the Contract time required to complete the Project or for failing to comply with associated milestones.

Liquidated Damages will end upon written notification from the Owner of Final Acceptance of the Project or upon written notification of from the Owner of completion of the milestone.

Notice to Proceed - A written communication issued by the County to the Contractor authorizing it to proceed with the work, establishing the date of commencement and completion of the work, and providing other direction to the Contractor.

Products shall mean materials or equipment permanently incorporated into the work.

Program Manager - Not used in this contract. Delete all references.

Project Manual - The Contract Documents.

Provide shall mean to furnish and install.

Substantial Completion - The date certified by the Construction Manager when all or a part of the work, as established pursuant to General Condition 0700-81, is sufficiently completed in accordance with the requirements of the contract documents so that the identified portion of the work can be utilized for the purposes for which it is intended.

Work or Project - All of the services specified, indicated, shown or contemplated by the contract documents, and furnishing by the Contractor of all materials, equipment, labor, methods, processes, construction and manufacturing materials and equipment, tools, plans, supplies, power, water, transportation and other things necessary to complete such services in accordance with the contract documents to ensure a functional and complete facility.

9-4 CODES

All codes, specifications, and standards referenced in the contract documents shall be the latest editions, amendments and revisions of such referenced standards in effect as of the date of the request for proposals for this contract.

9-5 REVIEW OF CONTRACT DOCUMENTS

Before making its proposal to the County, and continuously after the execution of the agreement, the Contractor shall carefully study and compare the contract documents and shall at once report to the Construction Manager any error, ambiguity, inconsistency or omission that may be discovered, including any requirement which may be contrary to any law, ordinance, rule, or regulation of any public authority bearing on the performance of the work. By submitting its proposal, the Contractor agrees that the contract documents, along with any supplementary written instructions issued by or through the Construction Manager that have become a part of the contract documents, appear accurate, consistent and complete insofar as can be reasonably determined. If the Contractor has timely reported in writing any error, inconsistency, or omission to the Construction Manager, has properly stopped the affected work until instructed to proceed, and has otherwise followed the instructions of the Construction Manager, the Contractor shall not be liable to the County for any damage resulting from any such error, inconsistency, or omission in the contract documents. The Contractor shall not perform any portion of the work without the contract documents, approved plans, specifications, products and data, or samples for such portion of the work. For purposes of this section "timely" is defined as the time period in which the contractor discovers, or should have discovered, the error, inconsistency, or omission, with the exercise of reasonable diligence.

9-6 STRICT COMPLIANCE

No observation, inspection, test or approval of the County or Construction Manager shall relieve the Contractor from its obligation to perform the work in strict conformity with the contract documents except as provided in General Condition 9-48.

9-7 APPLICABLE LAW

All applicable State laws, County ordinances, codes, and rules and regulations of all authorities having jurisdiction over the construction of the project shall apply to this agreement. The Contractor shall comply with the requirements of any Fulton County program concerning non-discrimination in contracting. All work performed within the right of way of the Georgia Department of Transportation and any railroad crossing shall be in accordance with Georgia Department of Transportation regulations, policies and procedures and, where applicable, those of any affected railroad. The Contractor shall comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work as specified and the Contractor agrees to indemnify and hold harmless the County, its officers, agents and employees, as well as the Construction Manager and the Program Manager against any claim or liability arising from or based on the violation of any law, ordinance, regulation, order or decree affecting the conduct of the work, whether occasioned by the Contractor, his agents or employees.

9-8 PERMITS, LICENSES AND BONDS

All permits and licenses necessary for the work shall be secured and paid for by the Contractor. If any permit, license or certificate expires or is revoked, terminated, or suspended as a result of any action on the part of the Contractor, the Contractor shall not be entitled to additional

compensation or time. The Contractor shall obtain and keep in force at all times performance and payment bonds payable to Fulton County in penal amounts equal to 100% of the Contract price.

9-9 TAXES

- A. The Contractor shall pay all sales, retail, occupational, service, excise, old age benefit and unemployment compensation taxes, consumer, use and other similar taxes, as well as any other taxes or duties on the materials, equipment, and labor for the work provided by the Contractor which are legally enacted by any municipal, county, state or federal authority, department or agency at the time bids are received, whether or not yet effective. The Contractor shall maintain records pertaining to such taxes and levies as well as payment thereof and shall make the same available to the County at all reasonable times for inspection and copying. The Contractor shall apply for any and all tax exemptions which may be applicable and shall timely request from the County such documents and information as may be necessary to obtain such tax exemptions. The County shall have no liability to the Contractor for payment of any tax from which it is exempt.
- B. The Contractor is obligated to comply with all local and State Sales and Use Tax laws. The Contractor shall provide the Owner with documentation to assist the Owner in obtaining sales and/or use tax refunds for eligible machinery and equipment used for the primary purpose of reducing or eliminating air or water pollution as provided for in Chapter 48-8-3 (36) and (37) of the Official Code of Georgia. All taxes shall be paid by the Contractor. All refunds will accrue to the Owner.

Acceptance of the project as complete and final payment will not be made by the Owner until the Contractor has fully complied with this requirement.

9-10 DELINQUENT CONTRACTORS

The County shall not pay any claim, debt, demand or account whatsoever to any person firm or corporation who is in arrears to the County for taxes. The County shall be entitled to a counterclaim, backcharge, and offset for any such debt in the amount of taxes in arrears, and no assignment or transfer of such debt after the taxes become due shall affect the right of the County to offset any taxes owed against said debt.

9-11 LIEN WAIVERS

The Contractor shall furnish the County with evidence that all persons who have performed work or furnished materials pursuant to this agreement have been paid in full prior to submitting its demand for final payment pursuant to this agreement. A final affidavit, Exhibit A, must be completed, and submitted to comply with requirements of 9-11. In the event that such evidence is not furnished, the County may retain sufficient sums necessary to meet all lawful claims of such laborers and materialmen. The County assumes no obligation nor in any way undertakes to pay such lawful claims from any funds due or that may become due to the Contractor.

9-12 MEASUREMENT

All items of work to be paid for per unit of measurement shall be subject to inspection, measurement, and confirmation by the Construction Manager.

9-13 ASSIGNMENT

The Contractor shall not assign any portion of this agreement or moneys due there from (include factoring of receivables) without the prior written consent of the County. The Contractor shall retain personal control and shall provide personal attention to the fulfillment of its obligations pursuant to this agreement. Any assignment without the express written consent of the County shall render this contract voidable at the sole option of the County.

9-14 FOREIGN CONTRACTORS

In the event that the Contractor is a foreign corporation, partnership, or sole proprietorship, the Contractor hereby irrevocably appoints the Secretary of State of Georgia as its agent for service of all legal process for the purpose of this contract only.

9-15 INDEMNIFICATION

The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any and all persons, including the Contractor's agents, servants, and employees, and in addition thereto, for any and all damages to property caused by or resulting from or arising out of any act or omission in connection with this contract or the prosecution of work hereunder, whether caused by the Contractor or the Contractor's agents, servants, or employees, or by any of the Contractor's subcontractors or suppliers, and the Contractor shall indemnify and hold harmless the County, the Construction Manager and the Program Manager, or any of their subcontractors from and against any and all loss and/or expense which they or any of them may suffer or pay as a result of claims or suits due to, because of, or arising out of any and all such injuries, deaths and/or damage, irrespective of County or Construction Manager negligence (except that no party shall be indemnified for their own sole negligence). The Contractor, if requested, shall assume and defend at the Contractor's own expense, any suit, action or other legal proceedings arising there from, and the Contractor hereby agrees to satisfy, pay, and cause to be discharged of record any judgment which may be rendered against the County and the Construction Manager arising there from.

In the event of any such loss, expense, damage, or injury, or if any claim or demand for damages as heretofore set forth is made against the County or the Construction Manager, the County may withhold from any payment due or thereafter to become due to the Contractor under the terms of this Contract, an amount sufficient in its judgment to protect and indemnify it and the Construction Manager from any and all claims, expense, loss, damages, or injury; and the County, in its discretion, may require the Contractor to furnish a surety bond satisfactory to the County providing for such protection and indemnity, which bond shall be furnished by the Contractor within five (5) days after written demand has been made therefore. The expense of said Bond shall be borne by the Contractor.

9-16 SUPERVISION OF WORK AND COORDINATION WITH OTHERS

The Contractor shall supervise and direct the work using the Contractor's best skill and attention. The Contractor shall be solely responsible for all construction methods and procedures and shall coordinate all portions of the work pursuant to the contract subject to the overall coordination of the Construction Manager. All work pursuant to this agreement shall be performed in a skillful and workmanlike manner.

The County reserves the right to perform work related to the Project with the County's own forces and to award separate contracts in connection with other portions of the project, other work on the site under these or similar conditions of the contract, or work which has been extracted from the Contractor's work by the County.

When separate contracts are awarded for different portions of the project or other work on the site, the term "separate contractor" in the Contract Documents in each case shall mean the contractor who executes each separate County Agreement.

The Contractor shall cooperate with the County and separate contractors in arranging the introduction and storage of materials and equipment and execution of their work, and shall cooperate in coordinating connection of its work with theirs as required by the Contract Documents.

If any part of the Contractor's Work depends for proper execution or results upon the work of the County or any separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Construction Manager any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results **within fourteen (14) days** of discovery of such discrepancy or defect. Failure of the Contractor to so report in writing shall constitute an acceptance of the County's or separate contractor's work as fit and

proper to receive the Work, except as to any defects which may subsequently become apparent in such work by others.

Any costs caused by defective or untimely work shall be borne by the party responsible therefore. Should the Contractor wrongfully cause damage to the work or property of the County or to other work or property on the site, including the work of separate contractors, the Contractor shall promptly remedy such damage at the Contractor's expense.

Should the Contractor be caused damage by any other contractor on the Project, by reason of such other contractor's failure to perform properly his contract with the County, no action shall lie against the County or the Construction Manager inasmuch as the parties to this agreement are the only beneficiaries hereof and there are no third party beneficiaries and neither the County nor the Construction Manager shall have liabilities therefore, but the Contractor may assert his claim for damages solely against such other contractor. The Contractor shall not be excused from performance of the contract by reason of any dispute as to damages with any other contractor or third party.

Where the Work of this Contract shall be performed concurrently in the same areas as other construction work, the Contractor shall coordinate with the Construction Manager and the separate contractors in establishing mutually acceptable schedules and procedures that shall permit all jobs to proceed with minimum interference.

If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up, the County may clean up and charge the cost thereof to the Contractor or contractors responsible therefore as the County shall determine to be just.

9-17 ADMINISTRATION OF CONTRACT

The Construction Manager shall provide administration services as hereinafter described. For the administration of this Contract, the Construction Manager shall serve as the County's primary representative during design and construction and until final payment to the Contractor is due. The Construction Manager shall advise and consult with the County. The primary point of contact for the Contractor shall be the Construction Manager. All correspondence from the Contractor to the County shall be forwarded through the Construction Manager. Likewise, all correspondence and instructions to the Contractor shall be forwarded through the Construction Manager.

The Construction Manager will determine in general that the construction is being performed in accordance with design and engineering requirements, and will endeavor to guard the County against defects and deficiencies in the Work.

The Construction Manager will not be responsible for or have control or charge of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, nor will it be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Construction Manager will not be responsible for or have control or charge over the acts or omissions of the Contractor, its engineers, consultants, subcontractors, or any of their agents or employees, or any other persons performing the Work.

Based on the Construction Manager's observations regarding the Contractor's Applications for Payment, the Construction Manager shall determine the amounts owing to the Contractor, in accordance with the payment terms of the Contract, and shall issue Certificates for Payment in such amount to the County.

The Construction Manager shall render interpretations necessary for the proper execution or progress of the Work. Either party to the Contract may make written requests to the Construction Manager for such interpretations.

Claims, disputes and other matters in question between the Contractor and the County relating to the progress of the Work or the interpretation of the Contract Documents shall be referred to the Construction Manager for interpretation.

All interpretations of the Construction Manager shall be consistent with the intent of and reasonably inferable from the Contract Documents and shall be in writing or in graphic form. Except as otherwise provided in this Contract, the Construction Manager shall issue a decision on any disagreement concerning a question of fact arising under this Contract. The Construction

Manager shall reduce the decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Construction Manager shall be final and conclusive unless, within thirty (30) days from the date of receipt of such copy, the Contractor files a written appeal with the Director of Public Works and mails or otherwise furnishes the Construction Manager a copy of such appeal. The decision of the Director of Public Works or the Director's duly authorized representative for the determination of such appeals shall be final and conclusive. Such final decision shall not be pleaded in any suit involving a question of fact arising under this Contract, provided such is not fraudulent, capricious, arbitrary, so grossly erroneous as necessarily implying bad faith, or is not supported by substantial evidence. In connection with any appeal proceeding under this Article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of Contractor's appeal. Pending any final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract as directed by the Construction Manager.

The Construction Manager shall have authority to reject Work which does not conform to the Contract Documents. Whenever, in the Construction Manager's opinion, it is considered necessary or advisable for the implementation of the intent of the Contract Documents, the County shall have authority to require special inspection or testing of the Work whether or not such Work be then fabricated, installed or completed. The Contractor shall pay for such special inspection or testing if the Work so inspected or tested is found not to comply with the requirements of the contract; the County shall pay for special inspection and testing if the Work is found to comply with the contract. Neither the Construction Manager's authority to act under this Subparagraph, nor any decision made by the Construction Manager in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Construction Manager to the Contractor, any subcontractor, any of their agents or employees, or any other person performing any of the Work.

The Contractor shall provide such shop drawings, product data, and samples as may be required by the Construction Manager and/or as required by these Contract Documents.

The Construction Manager shall conduct inspections to determine Substantial Completion and Final Completion, and shall receive and forward to the County for review written warranties and related documents required by the Contract Documents and assembled by the Contractor. The Construction Manager shall approve and issue Certificates for Payment upon compliance with Substantial and Final Completion requirements indicated in General Conditions 9-81, 9-82, 9-84 and 9-85 of this Agreement.

Except as provided in General Condition 9-48, the Contractor shall not be relieved from the Contractor's obligations to perform the work in accordance with the contract documents by the activities or duties of the County or any of its officers, employees, or agents, including inspections, tests or approvals, required or performed pursuant to this agreement.

9-18 RESPONSIBILITY FOR ACTS OF EMPLOYEES

The Contractor shall employ only competent and skilled personnel. The Contractor shall, upon demand from the Construction Manager, immediately remove any superintendent, foreman or workman whom the Construction Manager may consider incompetent or undesirable.

The Contractor shall be responsible to the County for the acts and omissions of the Contractor's employees, subcontractors, and agents as well as any other persons performing work pursuant to this agreement for the Contractor.

9-19 LABOR, MATERIALS, SUPPLIES, AND EQUIPMENT

Unless otherwise provided in this agreement, the Contractor shall make all arrangements with necessary support agencies and utility companies, provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the execution and completion of the work.

9-20 DISCIPLINE ON WORK SITE

The Contractor shall enforce strict discipline and good order among its employees and subcontractors at all times during the performance of the work, to include compliance with the

Fulton County Drug Free Work Place Policy. The Contractor shall not employ any subcontractor who is not skilled in the task assigned to it. The Construction Manager may, by written notice, require the Contractor to remove from the work any subcontractor or employee deemed by the Construction Manager to be incompetent.

9-21 HOURS OF OPERATION

All work at the construction site shall be performed during regular business hours of the FULTON County government, except upon the Construction Manager's prior written consent to other work hours. It is further understood that the Contractor's construction schedule is based on a normal 40 hours, five day work week, less Fulton County-recognized holidays. Contractors work schedule shall not violate Fulton County Noise Ordinance by working hours inconsistent with the Fulton County Noise Ordinance. The County's current noise ordinance or other applicable ordinance shall govern. If the Contractor desires to work in excess of this limit, the Contractor shall submit a written request to the Construction Manager, a minimum of five days prior to the desired work date. The Contractor shall be responsible for any additional expenses incurred by the Owner as a result of the extended work hours, including resident inspection overtime at the rate of \$41.92 per hour. The cost associated with resident inspector overtime shall be deducted from the Contractor monthly payment request.

9-22 FAMILIARITY WITH WORK CONDITIONS

The Contractor shall take all steps necessary to ascertain the nature and location of the work and the general and local conditions which may affect the work or the cost thereof. The Contractor's failure to fully acquaint itself with the conditions which may affect the work, including, but not limited to conditions relating to transportation, handling, storage of materials, availability of utilities, labor, water, roads, weather, topographic and subsurface conditions, other separate contracts to be entered into by the County relating to the project which may affect the work of the Contractor, applicable provisions of law, and the character and availability of equipment and facilities necessary prior to and during the performance of the work shall not relieve the Contractor of its responsibilities pursuant to this agreement and shall not constitute a basis for an equitable adjustment of the contract terms. The County reserves the right to perform with its own forces or to contract with other entities for other portions of the project work, in which case the Contractor's responsibility to assure its familiarity with work conditions hereunder shall include all coordination with such other contractors and the County necessary to ensure that there is no interference between contractors as will delay or hinder any contractor in its prosecution of work on the project. The County assumes no responsibility for any understandings or representations concerning conditions of the work made by any of its officers, agents, or employees prior to the execution of this agreement.

9-23 RIGHT OF ENTRY

The County reserves the right to enter the site of the work by such agent, including the Construction Manager, as it may elect for the purpose of inspecting the work or installing such collateral work as the County may desire. The Contractor shall provide safe facilities for such access so that the County and its agents may perform their functions.

9-24 NOTICES

Any notice, order, instruction, claim or other written communication required pursuant to this agreement shall be deemed to have been delivered or received as follows:

Upon personal delivery to the Contractor, its authorized representative, or the Construction Manager on behalf of the County. Personal delivery may be accomplished by in-person hand delivery or bona fide overnight express service.

Three days after depositing in the United States mail a certified letter addressed to the Contractor or the Construction Manager for the County. For purposes of mailed notices, the County's mailing address shall be 141 Pryor Street, 6th Floor, Atlanta, Georgia 30303, or as the County shall have otherwise notified the Contractor. The Contractor's mailing address shall be the

address stated in its proposal or as it shall have most recently notified the Construction Manager in writing.

9-25 SAFETY

A. SAFETY, HEALTH AND LOSS PREVENTION PROGRAM

The Contractor shall be responsible for implementing a comprehensive project-specific safety, health and loss prevention program and employee substance abuse program for this project. All Sub-Contractors must either implement their own program or follow the Contractor's safety, health and loss prevention program and employee substance abuse program.

The Contractor's safety, health and loss prevention program and employee substance abuse program must meet or exceed all governmental regulations (OSHA, EPA, DOT, State, local), and any other specific Fulton County Requirements.

B. DESIGNATION OF SAFETY REPRESENTATIVE

1. The Contractor will designate an employee by (name, phone number, pager number) as Site Safety Representative. This employee will have sufficient training and knowledge of safety and health principles, regulations, and procedures to report to the Contractor's Project Manager and/or Superintendent. Sub-Contractors must also designate a similar employee responsible for safety and health. The Sub-Contractor's safety designee will coordinate safety activities with the general contractor's safety designee.
2. For projects with significant risk or hazard potential or for any project for which the Contractor and its Sub-Contractors of any tier have 50 total employees or greater on site, Contractor must designate a qualified employee to be the full time Site Safety Representative. This person should address safety, health and loss prevention activities for the complete project including Sub-Contractors.

C. COUNTY'S SAFETY, HEALTH, AND LOSS PREVENTION PROCESS GUIDELINES AND REQUIREMENTS

The County and its agents reserve the right, but assume no duty, to establish and enforce safety, health, and loss prevention guidelines and to make the appropriate changes in the guidelines, for the protection of persons and property and to review the efficiency of all protective measures taken by the Contractor. The Contractor shall comply with all safety, health, and loss prevention process guidelines and requirements and changes made by the County or its agent(s). The issuance of any such guidelines or changes by the County or its agent(s) shall not relieve the Contractor of its duties and responsibilities under this Agreement, and the County or its agent(s) shall not thereby assume, nor be deemed to have assumed, any such duties or responsibilities of the Contractor.

D. COMPLIANCE OF WORK, EQUIPMENT, AND PROCEDURES WITH ALL APPLICABLE LAWS and REGULATIONS

All Work, whether performed by the Contractor or its Sub-Contractors of any tier, or anyone directly or indirectly employed by any of them, and all equipment, appliances, machinery, materials, tools and like items incorporated or used in the Work, shall be in compliance with and conform to:

1. All applicable laws, ordinances, rules, regulations and orders of any public, quasi-public or other governmental authority relating to the safety of persons and their protection against injury, specifically including, but in no event limited to, the Federal Occupational Safety and Health Act of 1970, as amended, and all rules and regulations now or hereafter in effect pursuant to said Act.

2. All rules, regulations, and requirements of the County or its agent(s) and its insurance carriers relating there to. In the event of a conflict or differing requirements the more stringent shall govern.

E. PROTECTION OF THE WORK

1. The Contractor shall, throughout the performance of the Work, maintain adequate and continuous protection of all Work and temporary facilities against loss or damage from whatever cause, shall protect the property of the County and third parties from loss or damage from whatever cause arising out of the performance of the Work, and shall comply with the requirements of the County or its agent(s) and its insurance carriers, and with all applicable laws, codes, rules and regulations, (as same may be amended) with respect to the prevention of loss or damage to property as a result of fire or other hazards.
2. The County or its agent(s) may, but shall not be required to, make periodic inspections of the Project work area. In such event, however, the Contractor shall not be relieved of its aforesaid responsibilities and the County or its agent(s) shall not assume, nor shall it be deemed to have assumed, any responsibility otherwise imposed upon the assurance of Contractor by this Agreement.

F. SAFETY EQUIPMENT

The Contractor shall provide to each worker on the Project work area the proper safety equipment for the duties being performed by that worker and will not permit any worker on the Project work area who fails or refuses to use the same. The County or its agent shall have the right, but not the obligation, to order the removal of a worker from the Project work site for his/her failure to comply with safe practices or substance abuse policies.

G. EMERGENCIES

1. In any emergency affecting the safety of persons or property, or in the event of a claimed violation of any federal or state safety or health law or regulation, arising out of or in any way connected with the Work or its performance, the Contractor shall act immediately to prevent threatened damage, injury or loss and to remedy said violation. Failing such action the County or its agent(s) may immediately take whatever steps it deems necessary including, but not limited to, suspending the Work as provided in this Agreement.
2. The County or its agent(s) may offset any and all costs or expenses of whatever nature, including attorneys' fees, paid or incurred by the County or its agent(s) (whether such fees are for in-house counsel or counsel retained by the County or its agent), in taking the steps authorized by Section 9-25(G) (1) above against any sums then or thereafter due to the Contractor. The Contractor shall defend, indemnify and hold the County, its officers, agents, employees and County's Construction Manager harmless against any and all costs or expenses caused by or arising from the exercise by the County of its authority to act in an emergency as set out herein. If the Contractor shall be entitled to any additional compensation or extension of time change order on account of emergency work not due to the fault or neglect of the Contractor or its Sub-Contractors, such additional compensation or extension of time shall be determined in accordance with General Condition 9-52 and General Condition 9-87 of this Agreement.

H. SUSPENSION OF THE WORK

1. Should, in the judgment of the County or its agent(s), the Contractor or any Sub-Contractor fail to provide a safe and healthy work place, the County or its agent shall have the right, but not the obligation, to suspend work in the unsafe areas until deficiencies are corrected. All costs of any nature (including, without limitation, overtime pay, liquidated damages or other costs arising out of delays)

resulting from the suspension, by whomsoever incurred, shall be borne by the Contractor.

2. Should the Contractor or any Sub-Contractor fail to provide a safe and healthy work place after being formally notified in writing by the County or its agents of such non-compliance, the contract may be terminated following the termination provision of the contract.
- I. CONTRACTOR'S INDEMNITY OF THE COUNTY FOR CONTRACTOR'S NON-COMPLIANCE WITH SAFETY PROGRAM
1. The Contractor recognizes that it has sole responsibility to assure its Safety Program is implemented and to assure its construction services are safely provided. The Contractor shall indemnify, defend and hold the County and its agents harmless, from and against any and all liability (whether public or private), penalties (contractual or otherwise), losses, damages, costs, attorneys' fees, expenses, causes of action, claims or judgments resulting, either in whole or in part, from any failure of the Contractor, its Sub-Contractors of any tier or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, to comply with the safety requirements of the contract. The Contractor shall not be relieved of its responsibilities under the safety requirements of the Contract should the County or its agent(s) act or fail to act pursuant to its rights hereunder.
 2. The Contractor shall not raise as a defense to its obligation to indemnify under this Subparagraph I any failure of those indemnified hereunder to assure Contractor operates safely, it being understood and agreed that no such failure shall relieve the Contractor from its obligation to assure safe operations or from its obligation to so indemnify. The Contractor also hereby waives any rights it may have to seek contribution, either directly or indirectly, from those indemnified hereunder.
 3. In any and all claims against those indemnified hereunder by any employee of the Contractor, any Sub-Contractor of any tier or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Subparagraph I shall not be limited in any way as to the amount or type of damages, compensation or benefits payable by or for the Contractor or any Sub-Contractor of any tier under any workers' compensation act, disability benefit or other employee benefit acts.

9-26 BLASTING AND EXCAVATION

The Contractor acknowledges that it is fully aware of the contents and requirements of O.C.G.A. § 25-9-1 through 25-9-12 concerning blasting and excavation near underground gas pipes and facilities and shall fully comply therewith.

9-27 HIGH VOLTAGE LINES

The Contractor acknowledges that it is fully aware of the contents and requirements O.C.G.A. § 46-3-30 through 46-3-39 concerning safeguards against contact with high voltage lines, and the Contractor shall fully comply with said provisions.

9-28 SCAFFOLDING AND STAGING

The Contractor acknowledges that it is the person responsible for employing and directing others to perform labor within the meaning of O.C.G.A. § 34-1-1 and agrees to comply with said provisions.

9-29 CLEAN-UP

The Contractor shall clean up all refuse, rubbish, scrap materials, and debris caused by its operations to the end that the site of the work shall present a neat, orderly and workmanlike appearance at all times.

9-30 PROTECTION OF WORK

The Contractor shall be responsible for maintenance and protection of the work, which shall include any County-furnished supplies, material, equipment, until final completion of this agreement and acceptance of the work as defined herein. Any portion of the work suffering injury, damage or loss shall be considered defective and shall be corrected or replaced by the Contractor without additional cost to the County.

9-31 REJECTED WORK

The Contractor shall promptly remove from the project all work rejected by the Construction Manager for failure to comply with the contract documents and the Contractor shall promptly replace and re-execute the work in accordance with the contract documents and without expense to the County. The Contractor shall also bear the expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

9-32 DEFECTIVE WORK

If the Contractor defaults or neglects to carry out any portion of the work in accordance with the contract documents, and fails within three days after receipt of written notice from the Construction Manager to commence and continue correction of such default or neglect with diligence and promptness, the County may, after three days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the County may have, make good such deficiencies and complete all or any portion of any work through such means as the County may select, including the use of a separate Contractor. In such case, an appropriate change order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies. In the event the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the County on demand.

The County may, at its option, accept defective or nonconforming work instead of requiring its removal or correction. In such case, a change order shall be issued reducing the price due the contractor to the extent appropriate and equitable. Such contract price adjustment shall be effected whether or not final payment has been made.

9-33 WARRANTY OF NEW MATERIALS

The Contractor warrants to the County that all materials and equipment furnished under this contract will be new unless otherwise specified, and the Contractor further warrants that all work will be of good quality, free from faults and defects, and in conformance with the contract documents. The warranty set forth in this paragraph shall survive final acceptance of the work.

9-34 CONTRACTOR'S WARRANTY OF THE WORK

If within one year after the date of issuance of the certificate of final payment pursuant to General Condition 84, or within such longer period of time as may be prescribed by law or by the term of any applicable special warranty required by the contract documents, any of the work is found to be defective or not in accordance with the contract documents, the Contractor shall correct such work promptly after receipt of written notice from the Construction Manager to do so. This obligation shall survive both final payment for the work and termination of the contract.

9-35 ASSIGNMENT OF MANUFACTURERS' WARRANTIES

Without limiting the responsibility or liability of the Contractor pursuant to this agreement, all warranties given by manufacturers on materials or equipment incorporated in the work are hereby

assigned by the Contractor to the County. If requested, the Contractor shall execute formal assignments of said manufacturer's warranties to the County. All such warranties shall be directly enforceable by the County.

9-36 WARRANTIES IMPLIED BY LAW

The warranties contained in this agreement, as well as those warranties implied by law, shall be deemed cumulative and shall not be deemed alternative or exclusive. No one or more of the warranties contained herein shall be deemed to alter or limit any other.

9-37 STOP WORK ORDERS

In the event that the Contractor fails to correct defective work as required by the contract documents or fails to carry out the work in accordance with contract documents, the Construction Manager, in writing, may order the Contractor to stop work until the cause for such order has been eliminated. This right of the County to stop work shall not give rise to any duty on the part of the County or the Construction Manager to execute this right for the benefit of the Contractor or for any other person or entity.

9-38 TERMINATION FOR CAUSE

If the Contractor is adjudged bankrupt, makes a general assignment for the benefit of creditors, suffers the appointment of a receiver on account of its insolvency, fails to supply sufficient properly skilled workers or materials, fails to make prompt payment to subcontractors or materialmen, disregards laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction, fails to diligently prosecute the work, or is otherwise guilty of a material violation of this agreement and fails within seven days after receipt of written notice to commence and continue correction of such default, neglect, or violation with diligence and promptness, the County may, after seven days following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the County may have, terminate the employment of the Contractor and take possession of the site as well as all materials, equipment, tools, construction equipment and machinery thereon. The County may finish the work by whatever methods the County deems expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is completed. If the unpaid balance of the contract price exceeds the cost of completing the work, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the County on demand. This obligation for payment shall survive the termination of the contract. Termination of this agreement pursuant to this paragraph may result in disqualification of the Contractor from bidding on future County contracts.

9-39 TERMINATION FOR CONVENIENCE

The County may, at any time upon written notice to the Contractor, terminate the whole or any portion of the work for the convenience of the County. The effective date of the terminations shall be provided in the written notice. Said termination shall be without prejudice to any right or remedy of the County provided herein. In addition, in the event this agreement has been terminated due to the default of the Contractor, and if it is later determined that the Contractor was not in default pursuant to the provisions of this agreement at the time of termination, then such termination shall be considered a termination for convenience pursuant to this paragraph.

9-40 TERMINATION FOR CONVENIENCE - PAYMENT

If the Contract is terminated for convenience by the Owner as provided in this article, Contractor will be paid compensation for those services actually performed as approved by the Owner or his representative. Partially completed tasks will be compensated for based on a signed statement of completion prepared by the Project Manager and submitted to the Contractor which shall itemize each task element and briefly state what work has been completed and what work remains to be

done. Contractor shall also be paid for reasonable costs for the orderly filing and closing of the project.

9-41 TERMINATION FOR CONVENIENCE - PAYMENT LIMITATIONS

Except for normal spoilage, and except to the extent that the County shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor the fair value, as determined by the Construction Manager, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to the County or to another buyer.

9-42 COST TO CURE

If the County terminates for cause the whole or any part of the work pursuant to this agreement, then the County may procure upon such terms and in such manner as the Construction Manager may deem appropriate, supplies or services similar to those so terminated, and the Contractor shall be liable to the County for any excess costs for such similar supplies or services. The Contractor shall continue the performance of this agreement to the extent not terminated hereunder.

9-43 ATTORNEY'S FEES

Should the Contractor default pursuant to any of the provisions of this agreement, the Contractor and its surety shall pay to the County such reasonable attorney's fees as the County may expend as a result thereof and all costs, expenses, and filing fees incidental thereto.

9-44 CONTRACTOR'S RESPONSIBILITIES UPON TERMINATION

After receipt of a notice of termination from the County, and except as otherwise directed by the Construction Manager, the Contractor shall:

1. Stop work under the contract on the date and to the extent specified in the notice of termination;
2. Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the agreement as is not terminated;
3. Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;
4. Assign to the County in the manner, at the times, and to the extent directed by the Construction Manager, all of the rights, title and interest of the Contractor under the orders and subcontracts so terminated, in which case the County shall have the right, at its discretion, to settle or pay any and all claims arising out of the termination of such orders or subcontracts;
5. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts with the approval or ratification of the Construction Manager, to the extent the Construction Manager may require, which approval or ratification shall be final for all purposes;
6. Transfer title and deliver to the entity or entities designated by the Construction Manager, in the manner, at the times, and to the extent, if any, directed by the Construction Manager, and to the extent specifically produced or specifically acquired by the Contractor for the performance of such portion of the work as has been terminated:
 - a. The fabricated or un-fabricated parts, work, and progress, partially completed supplies, and equipment, materials, parts, tools, dyes, jigs, and other fixtures, completed work, supplies, and other material

produced as a part of or acquired in connection with the performance of the work terminated by the notice of termination; and

- b. The completed or partially completed plans, drawings, information, and other property to the work.
7. Use its best efforts to sell in the manner, at the times, to the extent, and at the prices directed or authorized by the Construction Manager, any property described in Section 6 of this paragraph, provided, however, that the Contractor shall not be required to extend credit to any buyer and further provided that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the County to the Contractor pursuant to this agreement.
8. Complete performance of such part of the work as shall not have been terminated by the notice of termination; and
9. Take such action as may be necessary, or as the Construction Manager may direct, for the protection and preservation of the property related to the agreement which is in the possession of the Contractor and in which the County has or may acquire an interest.

9-45 RECORDS

The Contractor shall preserve and make available to the County all of its records, books, documents and other evidence bearing on the costs and expenses of the Contractor and any subcontractor pursuant to this agreement upon three days advance notice to the Contractor.

9-46 DEDUCTIONS

In arriving at any amount due the Contractor pursuant to the terms of this agreement, there shall be deducted all liquidated damages, advance payments made to the Contractor applicable to the termination portion of the contract, the amount of any claim which the County may have against the Contractor, the amount determined by the Construction Manager to be necessary to protect the County against loss due to outstanding potential liens or claims, and the agreed price of any materials acquired or sold by the Contractor and not otherwise recovered by or credited to the County.

9-47 REIMBURSEMENT OF THE COUNTY

In the event of termination, the Contractor shall refund to the County any amount paid by the County to the Contractor in excess of the costs properly reimbursable to the Contractor.

9-48 SUSPENSION, INTERRUPTION, DELAY, DAMAGES

The Contractor shall be entitled to only those damages and that relief from termination by the County as specifically set forth in this agreement. The Construction Manager may issue a written order requiring the Contractor to suspend, delay or interrupt all or any part of the work for such period of time as the County may determine to be appropriate for the convenience of the County. If the performance of the work is interrupted for an unreasonable period of time by an act of the County or any of its officers, agents, employees, contractors, or consultants in the administration of this agreement, an equitable adjustment shall be made for any increase in the Contractor's costs of performance and any increase in the time required for performance of the work necessarily caused by the unreasonable suspension, delay, or interruption. Any equitable adjustment shall be reduced to writing and shall constitute a modification to this agreement. In no event, however, shall an equitable adjustment be made to the extent that performance of this agreement would have been suspended, delayed or interrupted by any other cause, including the fault or negligence of the Contractor. No claim for an equitable adjustment pursuant to this paragraph shall be permitted before the Contractor shall have notified the Construction Manager

in writing of the act or failure to act involved, and no claim shall be allowed unless asserted in writing to the Construction Manager within ten (10) days after the termination of such suspension, delay or interruption.

9-49 COMMENCEMENT AND DURATION OF WORK

The County may issue a Notice to Proceed at any time within 120 days following execution of the contract by the County. The Contractor shall commence work pursuant to this agreement within ten (10) days of mailing or delivery of written notice to proceed. The Contractor shall diligently prosecute the work to completion within the time specified therefore in the Agreement. The capacity of the Contractor's construction and manufacturing equipment and plan, sequence and method of operation and forces employed, including management and supervisory personnel, shall be such as to ensure completion of the work within the time specified in the Agreement. The Contractor and County hereby agree that the contract time for completion of the work is reasonable taking into consideration the average climatic conditions prevailing in the locality of the work and anticipated work schedules of other contractors whose activities are in conjunction with or may affect the work under this contract.

9-50 TIME OF THE ESSENCE

All time limits stated in this agreement are of the essence of this contract.

9-51 IMPACT DAMAGES

Except as specifically provided pursuant to a stop work order or change order, the Contractor shall not be entitled to payment or compensation of any kind from the County for direct or indirect or impact damages including, but not limited to, costs of acceleration arising because of delay, disruption, interference or hindrance from any cause whatsoever whether such delay, disruption, interference or hindrance is reasonable or unreasonable, foreseeable or unforeseeable, or avoidable, provided, however, that this provision shall not preclude the recovery of damages by the Contractor for hindrances or delays due solely to fraud or bad faith on the part of the County, its agents, or employees. The Contractor shall be entitled only to extensions in the time required for performance of the work as specifically provided in the contract.

9-52 DELAY

The Contractor may be entitled to an extension of the contract time, but not an increase in the contract price or damages, for delays arising from unforeseeable causes beyond the control and without the fault or negligence of the Contractor or its subcontractors for labor strikes, acts of God, acts of the public enemy, acts of the state, federal or local government in its sovereign capacity, by acts of another separate contractor, or by an act or neglect of the County.

9-53 INCLEMENT WEATHER

The Contractor shall not be entitled to an extension of the contract time due to normal inclement weather. Unless the Contractor can substantiate to the satisfaction of the Construction Manager that there was greater than normal inclement weather and that such greater than normal inclement weather actually delayed the work, the Contractor shall not be entitled to an extension of time therefore. The following shall be considered the normal inclement weather days for each month listed, and extensions of time shall be granted in increments of not less than one half day only for inclement weather in excess of the days set out.

January	10 days
February	10 days
March	7 days
April	6 days
May	4 days
June	3 days

July	4 days
August	2 days
September	2 days
October	3 days
November	6 days
December	9 days

9-54 DELAY - NOTICE AND CLAIM

The Contractor shall not receive an extension of time unless a Notice of Delay is filed with the Construction Manager within ten (10) days of the first instance of such delay, disruption, interference or hindrance and a written Statement of the Claim is filed with the Construction Manager within 20 days of the first such instance. In the event that the Contractor fails to comply with this provision, it waives any claim which it may have for an extension of time pursuant to this agreement.

9-55 STATEMENT OF CLAIM - CONTENTS

The Statement of Claim referenced in the preceding 9-54 shall include specific information concerning the nature of the delay, the date of commencement of the delay, the construction activities affected by the delay, the person or organization responsible for the delay, the anticipated extent of the delay, and any recommended action to avoid or minimize the delay.

9-56 WORK BEHIND SCHEDULE, REMEDY BY CONTRACTOR

If the work actually in place falls behind the currently updated and approved schedule, and it becomes apparent from the current schedule that work will not be completed within the contract time, the Contractor agrees that it will, as necessary, or as directed by the Construction Manager, take action at no additional cost to the County to improve the progress of the work, including increasing manpower, increasing the number of working hours per shift or shifts per working day, increasing the amount of equipment at the site, and any other measure reasonably required to complete the work in a timely fashion.

9-57 DILIGENCE

The Contractor's failure to substantially comply with the requirements of the preceding paragraph may be grounds for determination by the County that the Contractor is failing to prosecute the work with such diligence as will ensure its completion within the time specified. In such event, the County shall have the right to furnish, from its own forces or by contract, such additional labor and materials as may be required to comply with the schedule after 48 hours written notice to the Contractor, and the Contractor shall be liable for such costs incurred by the County.

9-58 SET-OFFS

Any monies due to the Contractor pursuant to the preceding paragraph of this agreement may be deducted by the County against monies due from the County to the Contractor.

9-59 REMEDIES CUMULATIVE

The remedies of the County under General Condition 56, 57, and 58 are in addition to and without prejudice to all of the rights and remedies of the County at law, in equity, or contained in this agreement.

9-60 TITLE TO MATERIALS

No materials or supplies shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sales contract or other agreement by which any

interest is retained by the seller. The Contractor hereby warrants that it has good and marketable title to all materials and supplies used by it in the work, and the Contractor further warrants that all materials and supplies shall be free from all liens, claims, or encumbrances at the time of incorporation in the work.

9-61 INSPECTION OF MATERIALS

All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards and in accordance with the requirements of the contract documents. Additional tests performed after the rejection of materials or equipment shall be at the Contractor's expense.

9-62 CONSTRUCTION MANAGER'S PRESENCE DURING TESTING

All tests performed by the Contractor shall be witnessed by the Construction Manager unless the requirement therefore is waived in writing. The Construction Manager may perform additional tests on materials previously tested by the Contractor, and the Contractor shall furnish samples for this purpose as requested.

9-63 MATERIALS INCORPORATED IN WORK

The Contractor shall furnish all materials and equipment to be incorporated in the work. All such materials or equipment shall be new and of the highest quality available. Manufactured materials and equipment shall be obtained from sources which are currently manufacturing such materials, except as otherwise specifically approved by the Construction Manager.

9-64 STORAGE OF MATERIALS

Materials and equipment to be incorporated in the work shall be stored in such a manner as to preserve their quality and fitness for the work and to facilitate inspection.

9-65 PAYROLL REPORTS

The Contractor may be required to furnish payroll reports to the Construction Manager as required.

9-66 CONTRACTORS' REPRESENTATIVE

Before beginning work, the Contractor shall notify the Construction Manager in writing of one person within its organization who shall have complete authority to supervise the work, receive orders from the Construction Manager, and represent the Contractor in all matters arising pursuant to this agreement. The Contractor shall not remove its representative without first designating in writing a new representative. The Contractor's representative shall normally be present at or about the site of work while the work is in progress. When neither the Contractor nor its representative is present at the work site, the superintendent, foreman, or other of the Contractor's employee in charge of the work shall be an authorized representative of the Contractor.

9-67 SPECIALTY SUB-CONTRACTORS

The Contractor may utilize the services of specialty subcontractors on those parts of the project which, under normal contracting practices, are performed by specialty subcontractors. The Contractor shall not award more than seventy-five percent of the work to subcontractors.

9-68 INSPECTION BY THE CONSTRUCTION MANAGER

All work pursuant to this agreement shall be subject to inspection by the Construction Manager for conformity with contract drawings and specifications. The Contractor shall give the Construction Manager reasonable advance notice of operations requiring special inspection of a portion of the work.

9-69 WORK COVERED PRIOR TO CONSTRUCTION MANAGER'S INSPECTION

In the event that work is covered or completed without the approval of the Construction Manager, and such approval is required by the specifications or required in advance by the Construction Manager, the Contractor shall bear all costs involved in inspection notwithstanding conformance of such portion of the work to the contract drawings and specifications.

9-70 SCHEDULING OF THE WORK

The work of this contract shall be planned, scheduled, executed, and reported using the critical path method (CPM) as established in Section 01320 of these Contract Documents. Within ten (10) calendar days after the Notice to Proceed, the Contractor shall submit a Detailed Construction Schedule according to the requirements established herein. (Section 01 310)

9-71 PROGRESS ESTIMATES

The Contractor shall prepare a written report for the Construction Manager's approval, on County forms, of the total value of work performed and materials and equipment obtained to the date of submission. Such a report must accompany each request for a progress payment and is subject to review and approval by the Construction Manager. Approval of a progress estimate or tendering of a progress payment shall not be considered an approval or acceptance of any work performed, and all estimates and payments shall be subject to correction in subsequent estimates. Progress payments shall be made for all completed activities and for materials suitably stored on-site.

9-72 PROGRESS PAYMENTS

Upon approval of each monthly estimate of work performed and materials furnished, the Construction Manager shall approve payment to the Contractor for the estimated value of such work, materials, and equipment, less the amount of all prior payments and any liquidated damages. The Contractor will be paid 100 percent, less retainage, of the cost of materials received and properly stored on-site but not incorporated into the work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale to establish the County's title to such materials or equipment. The Contractor's request for payment shall provide sufficient detail as to the work completed or materials purchased for which payment is requested to permit meaningful review by the Construction Manager.

9-73 TIME OF PAYMENT

The Contractor will be paid within 45 days following receipt of an approved Progress Estimate. The Contractor expressly agrees that the payment provisions within this Contract shall supersede the rates of interest, payment periods, and contract and subcontract terms provided for under the Georgia Prompt Pay Act, O.C.G.A. Section 13-11-1 et seq., and that the rates of interest, payment periods, and contract and subcontract terms provided for under the Prompt Pay Act shall have no application to this Contract. The County shall not be liable for any late payment interest or penalty.

9-74 RETAINAGE

The County shall retain from each progress payment ten (10) percent of the estimated value of the work performed until the progress payments, including retainage, total 50 percent of the contract price. If a contract includes two or more projects or assignments that have been separately priced and have separate budgets, and the performances of such projects or assignments are not related to or dependent upon the performance of any other, the 50 per cent limit shall be based upon the price for each individual project or assignment. Thereafter, no further retainage shall be withheld so long as the Contractor is making satisfactory progress to ensure completion of the work within the time specified therefore. The County may reinstate the ten (10) percent retainage in the event the Construction Manager determines that the Contractor

is not making satisfactory progress to complete the work within the time specified in this agreement or in the event that the Construction Manager provides a specific cause for such withholding. The County may also withhold retainage upon substantial completion of the work as provided in O.C.G.A. §13-10-81(c). Interest may be paid upon the retainage in accordance with Georgia law.

9-75 PAYMENT OF SUBCONTRACTORS

The Contractor shall promptly pay each subcontractor upon the receipt of payment from the County. Such payment shall be made from the amount paid to the Contractor pursuant to the subcontractor's work. The Contractor shall also maintain the records of the percentage retained from payments to the Contractor pursuant to such subcontractor's work. The Contractor shall procure agreements from each subcontractor requiring each subcontractor to pay their subcontractors, agents and employees in a similar manner. The County reserves the right to inquire of any subcontractor, supplier, materialmen, or subconsultant, the status of any indebtedness of the Contractor. The County further reserves the right to require the Contractor to designate on each instrument of payment exceeding \$400.00 to subcontractors, suppliers, materialmen, and subconsultants that such payment is on account of the work under this Contract.

9-76 COUNTY'S RESPONSIBILITIES TO SUBCONTRACTORS

Neither the County nor the Construction Manager shall have any obligation to pay any subcontractor except as otherwise required by law.

9-77 PROGRESS PAYMENTS - ACCEPTANCE OF WORK

Certification of progress payments, as well as the actual payment thereof, shall not constitute the County's acceptance of work performed pursuant to this agreement.

9-78 PAYMENTS IN TRUST

All sums paid to the Contractor pursuant to this agreement are hereby declared to constitute trust funds in the hands of the contractor to be applied first to the payment of claims of subcontractors, laborers, and suppliers arising out of the work, to claims for utilities furnished and taxes imposed, and to the payment of premiums on surety and other bonds and on insurance for any other application.

9-79 JOINT PAYMENTS

The County reserves the right to issue any progress payment or final payment by check jointly to the Contractor and any subcontractor or supplier.

9-80 RIGHT TO WITHHOLD PAYMENT

The Construction Manager may decline to approve payment and may withhold payment in whole or in part to the extent reasonable and necessary to protect the County against loss due to defective work, probable or actual third party claims, the Contractor's failure to pay subcontractors or materialmen, reasonable evidence that the work will not be completed within the contract time or contract price or damage to the County or any other contractor on the project.

9-81 CERTIFICATE OF SUBSTANTIAL COMPLETION

Upon the Contractor's submission of a request for a certificate of Substantial Completion, the Construction Manager shall inspect the work and determine whether the work is Substantially Complete. If the work is Substantially Complete, the Construction Manager shall issue a certificate of Substantial Completion of the work which shall establish the date of Substantial Completion, shall state the responsibilities of the County and the Contractor for security, maintenance, heat, utilities, damage to the work and insurance, and shall fix the time within which

the Contractor shall complete the items submitted by the Contractor as requiring correction or further work. The certificate of substantial completion of the work shall be submitted to the County and the Contractor for their written acceptance of the responsibilities assigned to them pursuant to such certificate.

If in the sole opinion of the Construction Manager, the work is not substantially complete, the Construction Manager shall notify the Contractor of such, in writing, and outline requirements to be met to achieve Substantial Completion.

9-82 PAYMENT UPON SUBSTANTIAL COMPLETION

Upon Substantial Completion of the work and upon application by the Contractor and approval by the Construction Manager, the County shall make payment reflecting 100% work completed, less value of work remaining as determined by Construction Manager and any authorized retainage.

9-83 COMMENCEMENT OF WARRANTIES

Warranties required by this agreement shall commence on the date of final completion of the project as determined under General Condition 9-84 unless otherwise provided in the certificate of Substantial Completion.

9-84 FINAL PAYMENT - WAIVER OF CLAIMS, DISPUTE OF FINAL PAYMENT

The acceptance of the Substantial Completion payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of application for payment at Substantial Completion and except for the retainage sums due at final acceptance. Following the Construction Manager's issuance of the certificate of Substantial Completion and the Contractor's completion of the work pursuant to this agreement, the Contractor shall forward to the Construction Manager a written notice that the work is ready for final inspection and acceptance. If after inspection the Construction Manager certifies that the work is complete and issues written notification of such to the Contractor, the Contractor shall forward to the Construction Manager a final application for payment. The Construction Manager shall issue a certificate for payment, which shall approve final payment to the Contractor and shall establish the date of final completion.

In the event the Contractor timely disputes the amount of the final payment, the amount due the CONTRACTOR shall be deemed by the CONTRACTOR and the COUNTY to be an unliquidated sum and no interest shall accrue or be payable on the sum finally determined to be due to the CONTRACTOR for any period prior to final determination of such sum, whether such determination be by agreement of the CONTRACTOR and the COUNTY or by final judgment of the proper court in the event of litigation between the COUNTY and the CONTRACTOR. The CONTRACTOR specifically waives and renounces any and all rights it may have under Section 13-6-13 of the Official Code of Georgia and agrees that in the event suit is brought by the CONTRACTOR against the COUNTY for any sum claimed by the CONTRACTOR under the Contract or for any extra or additional work, no interest shall be awarded on any sum found to be due from the COUNTY to the CONTRACTOR in the final judgment entered in such suit. All final judgments shall draw interest at the legal rate, as specified by law.

9-85 DOCUMENTATION OF COMPLETION OF WORK

Neither the final payment nor the remaining retainage shall become due until the Contractor submits the following documents to the Construction Manager:

- a. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid or otherwise satisfied;
- b. The surety's consent to final payment; and
- c. Any other data reasonably required by the County or Construction Manager establishing payment or satisfaction of all such obligations, including releases, waivers of liens, and documents of satisfaction of debts.

In the event that a subcontractor refuses to furnish a release or waiver as required by the County or Construction Manager, the Contractor may furnish a bond satisfactory to the County to indemnify the County against such loss. In the event that any lien or indebtedness remains unsatisfied after all payments are made, the contractor shall refund to the County all moneys that the County may become compelled to pay in discharging such lien or other indebtedness, including all costs and reasonable attorney's fees.

9-86 GOVERNING LAW

Each and every provision of this agreement shall be construed in accordance with and governed by Georgia law. The parties acknowledge that this contract is executed in FULTON County, Georgia and that the contract is to be performed in FULTON County, Georgia. Each party hereby consents to the FULTON Superior Court's sole jurisdiction over any dispute which arises as a result of the execution or performance of this agreement, and each party hereby waives any and all objections to venue in the FULTON Superior Court.

9-87 CHANGES IN THE WORK

A. CHANGE ORDERS

1. A Change Order is a written order to the Contractor signed to show the approval and the authorization of the County, issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum or the Contract Time. Change Orders shall be written using forms designated by the County with Contractor providing supporting documentation as required by the Construction Manager. The Contract Sum and the Contract Time may be changed only by approved Change Order pursuant to Fulton County Procedure 800-6. The amount payable by the Change Order is payment in full for all direct and indirect costs incurred and related to the work under said Change Order, including but not limited to delays, imports, acceleration, disruption and extended overhead. A Change Order signed by the Contractor indicates the Contractor's agreement therewith, including the adjustment in either or both of the Contract Sum or the Contract Time.
2. The County, without invalidating the Contract, may order changes in the Work within the general scope of the Contract as defined herein. The time allowed for performance of the work and the contract price to be paid to the Contractor may be adjusted accordingly.
3. The cost or credit to the County resulting from a change in the Work shall be determined in one or more of the following ways:
 - a. By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
 - b. By unit prices stated in the Contract Documents or subsequently agreed upon;
 - c. By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
 - d. By the method provided in Subparagraph A4 below.
4. If none of the methods set forth in Subparagraphs 3a, 3b, or 3c above is agreed upon, the Contractor, provided a written order signed by the Construction Manager is received, shall promptly proceed with the Work involved. The cost of such Work shall then be determined by the Construction Manager on basis of the reasonable expenditures and savings of those performing the Work attributable to the change. The cost of the change shall include only the items listed in Subparagraph 5a below, and in the case of either a decrease or an increase in the Contract Sum, an allowance for overhead and profit in accordance with the

schedules set forth in Subparagraphs 5b and 6 below shall be applied to the cost or credit.

- a. In such case, and also under Subparagraph 3a above, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting of all actual costs expended, together with appropriate supporting data for inclusion in a Change Order.
 - b. All hourly rate charges shall be submitted to the Construction Manager for prior review and approval. All hourly rate charges shall be properly supported as required by the Construction Manager with certified payrolls, or their acceptable equivalent. When authorized to proceed for a given change and actual expenditures have been made prior to execution of a Change Order for the entire change, such actual expenditures may be summarized monthly, and if approved, incorporated into a Change Order. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase or decrease, if any, with respect to that change.
5. In Subparagraphs 3 and 4 above, the items included in "Cost" and "Overhead" shall be based on the following schedule:
 - a. Unless otherwise provided in the Contract Documents, "Cost" shall be limited to the following: cost of materials incorporated into the Work, including sales tax and cost of delivery; cost of direct labor (labor cost may include a pro rata share of foreman's account of the change) including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; workers' or workmen's compensation insurance; rental value of equipment and machinery; costs for preparing Shop Drawings.
 - b. Unless otherwise provided in the Contract Documents, "Overhead" shall include the following: bond and insurance premiums including increase and decreases from change in the Work, supervision, superintendence, construction parking, wages of timekeepers, watchmen and clerks, small tools, consumable supplies, expendables, incidentals, general office expense, the cost of additional reproduction for the Contractor's subcontractors beyond that agreed upon in the Contract Documents, construction parking, any additional costs of craft supervision by the Contractor's or subcontractors' superintendents, and overhead charges which would be customary and expended regardless of the change in the Work due to other overlapping activities which are included as part of the original Contract, and all other expenses not included in "Cost" above.
 - c. In the event that a change is issued by the County which would require the expenditure of substantial amounts of special supervision (beyond the foreman level) by the Contractor, the Contractor may, at the sole direction of the Construction Manager, be allowed to incorporate these charges into the agreement cost for the change.
6. In Subparagraphs 3 and 4 above, the allowance for overhead and profit combined, included in the total cost or credit to the County, shall be based on the following schedule:
 - a. For the Contractor, for any work performed by the Contractor's own forces, ten (10) percent of the cost.
 - b. For the Contractor, for any work performed by a Contractor's subcontractor, five (5) percent of the amount due the subcontractor.

- c. For each subcontractor or sub-subcontractor involved, for any work performed by that subcontractor's or sub-subcontractor's own forces, ten (10) percent of the cost.
 - d. For each subcontractor, for work performed by a sub-subcontractor, five (5) percent of the amount due to the sub-subcontractor.
 - e. Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 5 above unless modified otherwise.
7. In order to facilitate checking of quotations for extras or credits, all proposals or bids, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs, including labor cost, materials and subcontracts. Labor and materials shall be itemized in the manner defined in Subparagraph 4 above. Where major cost items are subcontracts, they shall be itemized also. In no case shall a change be approved without such itemization.
 8. No payment shall be made for any changes to the contract that are not included in a fully executed Change Order.

B. CONCEALED, UNKNOWN AND DIFFERING CONDITIONS

1. Should concealed conditions be encountered in the performance of the Work below the surface of the ground, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the Contract Documents, or should unknown physical conditions below the surface of the ground or concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the Contract Sum and Contract Time shall be equitably adjusted by Change Order upon request by either party made within twenty (20) days after the first observance of the conditions. No such request for equitable adjustment shall be valid unless the Contractor complies with this (20) days notice and Subparagraph C.1. below.
2. The Contractor shall promptly, and before such conditions are disturbed, notify the Construction Manager in writing of any claim of concealed, unknown or differing conditions pursuant to this paragraph. The Construction Manager shall authorize the Engineer to investigate the conditions, and if it is found that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the Work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be recommended to the Construction Manager.
3. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in (a) above, prior to disturbing the condition.
4. No claim by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.
5. Any materially differing site condition as between what is shown on the Drawings and Specifications and actually found on site shall be immediately reported to the Construction Manager in writing prior to the commencement of Work at the site. Failure of the Contractor to notify the Construction Manager in writing of the differing site condition prior to performance of Work at the site shall constitute a waiver of any claim for additional monies. Any Change Order necessitated by the differing site condition shall be processed as provided under "Changes in the Contract".

C. REQUESTS FOR ADDITIONAL COST

1. If the Contractor wishes to request an increase in the Contract Sum, the Contractor shall give the Construction Manager written notice thereof within twenty (20) days after the occurrence of the event, or identification of the conditions, giving rise to such request. This notice shall be given by the Contractor before proceeding to execute the Work, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Paragraph 10.7 of this Agreement, and Subparagraph A.4 above. No such request shall be valid unless so made within the twenty (20) days specified above. If the County and the Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined by the Construction Manager. Any change in the Contract Sum resulting from such claim shall be documented by Change Order.
2. If the Contractor claims that addition cost is involved because of, but not limited to (1) any written interpretation pursuant to General Condition 9-17 of this Agreement, (2) any order by the County to stop the Work pursuant to General Conditions 9-25 and 9-37 of this Agreement where the Contractor was not at fault, or any such order by the Construction Manager as the County's agent, or (3) any written order for a minor change in the Work issued pursuant to Paragraph D below, the Contractor shall submit a request for an increase in the Contract Sum as provided in Subparagraph C.1 above. No such claim shall be valid unless the Contractor complies with Subparagraph C.1 above and approved by the County pursuant to Change Order Policy 800-6.

D. MINOR CHANGES IN THE WORK

The Construction Manager may order minor changes in the Work not involving an adjustment in the Contract Price, extension of the time allowed for performance of the work and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by a written Change Directive issued by the Construction Manager, and shall be binding on the County and the Contractor. The Contractor shall carry out such written orders promptly.

E. BONDS

If any change order results in an increase in the contract price, the contractor shall increase the penal sum of the performance and payment bonds to equal the increased price.

9-88 DISAGREEMENT WITH ORDERS FOR CHANGE

Contractor's written acceptance of a Change Order or other order for changes shall constitute his final and binding agreement to the provisions thereof and a waiver of all claims in connection therewith, whether direct or consequential in nature. Should Contractor disagree with any order for changes, he may submit a notice of potential claim to the Construction Manager, at such time as the order is set forth in the form of a Change Order. Disagreement with the provisions of an order for changes shall not relieve Contractor of his obligation under Clause 9-87, Change Orders.

9-89 NO WAIVER OF REMEDIES

Exercise by the County of any remedy is not exclusive of any other remedy available to County and shall not constitute a waiver of any such other remedies. Failure of the County to exercise any remedy, including breach of contract remedies, shall not preclude the County from exercising such remedies in similar circumstances in the future.

9-90 LAND AND RIGHTS-OF-WAY

The owner will provide, as indicated in the Contract Documents and prior to Notice to Proceed, the lands upon which the work is to be done, right-of-way for access thereto, and such other lands which are designated for the use of the Contractor. The Contractor shall confine the Contractor's work and all associated activities to the easements and other areas designated for

the Contractor's use. The Contractor shall comply with any limits on construction methods and practices which may be required by easement agreements. If, due to some unforeseen reason, the necessary easements are not obtained, the Contractor shall receive an equitable extension of contract time dependent upon the effect on the critical path of the project schedule or the County may terminate the Contract for its convenience.

9-91 COORDINATION WITH STATE DEPARTMENT OF TRANSPORTATION

No clearing or grading shall be completed by Contractor within the State Department of Transportation (DOT) area under construction. The Contractor must coordinate his construction scheduling with DOT.

If the Contractor begins work before DOT's completion date, he must obtain the approval of DOT before starting work in the area. The state DOT has the right to stop the Contractor's work in the DOT area.

The Contractor shall receive no additional compensation or damages resulting from delay or work stoppage from DOT actions or scheduling.

Contractor shall obtain DOT drawings of the DOT project area for verification of road geometry, storm drains, etc. from Georgia Department of Transportation or Fulton County. The Contractor is responsible for obtaining any pertinent DOT revisions.

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EXHIBIT A**FINAL AFFIDAVIT**

TO FULTON COUNTY, GEORGIA

I, _____, hereby certify that all suppliers of materials, equipment and service, subcontractors, mechanic, and laborers employed by _____ or any of his subcontractors in connection with the design and/or construction of _____ at Fulton County have been paid and satisfied in full as of _____, 200____, and that there are no outstanding obligations or claims of any kind for the payment of which Fulton County on the above-named project might be liable, or subject to, in any lawful proceeding at law or in equity.

Signature_____
Title

Personally appeared before me this _____ day of _____, 200____.
_____, who under Oath deposes and says that he is
_____ of the firm of _____, that he has read the
above statement and that to the best of his knowledge and belief same is an exact true
statement.

Notary Public_____
My Commission expires

END OF SECTION 9

SECTION 10

SPECIAL CONDITIONS

NO SPECIAL CONDITIONS FOR THIS PROJECT.

SECTION 11

PRICING FORMS

This section contains the appropriate schedules of pricing forms such as schedule of quantities and prices or schedule of unit and lump sum prices for this project.

Item No	Description	Approx. Quantity	Unit	Unit Price	Extension
(1)	Clearing and Grubbing	1	ACRE	\$	\$
(2)	Tree Removal				
A.	12" to 24" Diameter	10	EA	\$	\$
(3)	Rock				
A.	Trench Rock Base Cost	100	CY	\$	\$
B.	Trench Rock Premium Cost	100	CY	\$	\$
(4)	Water Main				
A.	Restrained DIP Water Main (Installed)				
1.	6" Class 350 DIP w/ Restrained Joint (RJ)	1000	LF	\$	\$
2.	8" Class 350 DIP w/ RJ	7650	L.F.	\$	\$
3.	12" Class 350 DIP w/RJ	650	L.F.	\$	\$
4.	16" Class 350 DIP w/RJ	150	L.F.	\$	\$
5.	24" Class 250 DIP w/RJ	7260	L.F.	\$	\$
B.	Cut , Cap and Block Existing Water Main				
1.	8-inch Transite Pipe	4	Ea	\$	\$
2.	12-inch Transite Pipe	12	Ea	\$	\$
C.	Remove & Dispose of Abandoned Pipe on River Bank @ Big Creek (See Drawings)	1	LS	\$	\$

D. Remove & Dispose of
Exst. Pressure Regulator &
Vault. (See Drawings)

1	LS	\$	\$
---	----	----	----

(5) (Polyethylene Encasement

A. Single Encasement

a. 12" and smaller

8600	L.F.	\$	\$
------	------	----	----

b. 16" to 24"

5600	L.F.	\$	\$
------	------	----	----

B. Double Encasement

a. 16" to 24"

2100	L.F.	\$	\$
------	------	----	----

(6) Fittings

A. 12" and smaller

5.6	TONS	\$	\$
-----	------	----	----

B. 16" to 24"

14.6	TONS	\$	\$
------	------	----	----

(7) Valves

A. Gate Valves

1. 8" Gate Valve

16	EA	\$	\$
----	----	----	----

2. 12" Gate Valve

6	EA	\$	\$
---	----	----	----

B. Butterfly Valve

1. 16" Butterfly Valve -
w/RJ (Megalug)

3	EA	\$	\$
---	----	----	----

2. 24" Butterfly Valve -
w/RJ (Megalug)

14	EA	\$	\$
----	----	----	----

(8) Connection into Existing
Water Mains

A. Tapping Sleeve & Valve

1. 8" x 8"

4	EA	\$	\$
---	----	----	----

2. 12" x 8"

4	EA	\$	\$
---	----	----	----

3. 12" x 12"

4	EA	\$	\$
---	----	----	----

B. Remove Plug & Connect to
Existing Water Main

1. 8"

2	EA	\$	\$
---	----	----	----

2. 12"

4	EA	\$	\$
---	----	----	----

(9) Hydrant Assembly

47	EA	\$	\$
----	----	----	----

Remove Exst. Fire Hydrants
(Deliver to Owner)

7	EA	\$	\$
---	----	----	----

Cut & Cap Exst, 6-inch DIP
Conn. To Fire Hydrants

7	EA	\$	\$
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(10) Air Valve				
A. 6-inch	4	EA	\$	\$
B. 4-inch	1	EA	\$	\$
(11) Concrete Thrust Collar and Blocks	400	CY	\$	\$
(12) Concrete Pipe Encasement	30	CY	\$	\$
Bore and Jack Casings (Per Bore Length – Includes Casing, Carrier Pipe, Spacers & Grout)				
A. 16" Steel Casing (0.250" wall thickness)	180	L.F.	\$	\$
B. 20" Steel Casing (0.312 wall thickness)	250	L.F.	\$	\$
C. 36" Steel Casing (0.500" wall thickness)	250	L.F.	\$	\$
(14) Open Cut Installation with Steel Casing – Includes Casing, Carrier Pipe, Spacers & Grout)				
A. 36" Steel Casing (0.500" wall thickness)	190	L.F.	\$	\$
(15) Trench Stabilization	150	CY	\$	\$
(16) Relocate Meter Assembly and Vault				
A. 1" and smaller	1	EA	\$	\$
B. 1 ¼" to 3 "	1	EA	\$	\$
C. Larger than 3"	1	EA	\$	\$
(17) Water Service Changeovers				
A. 1" and smaller				
1. Short side	50	EA	\$	\$
2. Long side	60	EA	\$	\$
B. 1 ¼" to 3 "				
1. Short side	5	EA	\$	\$
C. Larger than 3"				
1. Short side	5	EA	\$	\$
D. PVC Casing – 6"				
1. Long side	3000	LF	\$	\$
(18) Traffic Signal Loop Detectors	1	Pair	\$	\$

(19) Remove and Replace Catch Basin			
A. Single Wing (DOT1033D)	1	EA	\$
B. Double Wing (DOT 1034D)	1	EA	\$
(20) Valve Abandonment for 8" and 12" Gate Valves			
	8	EA	\$
(21) Valve Removal for 12" Valves			
	3	EA	\$
(22) Remove and Replace Driveway			
A. Asphalt	135	SQ. YD.	\$
B. Concrete	135	SQ. YD.	\$
(23) Remove and Replace Curb and Gutter			
A. 18"	400	L.F.	\$
B. 24"	600	L.F.	\$
(24) Remove and Replace Pavement			
A. Asphalt Pavement Resurfacing w/ Milling	11300	SQ. YD.	\$
B. Pavement Replacement Concrete Sub-Base	5400	SQ. YD.	\$
C. Asphalt Pavement Overlay w/o Milling	2400	SQ. YD.	\$
(25) Pavement Marking and Striping			
	600	L.F.	\$
(26) Remove and Replace Concrete Sidewalk			
	400	SY	\$
(27) Meter Vault to Include			
A. Cast-In-Place Reinforced Concrete Vault			
B. Flow Meter & Control Valve Complete w/ Instrumentation & SCADA System			
C. Vault Accessories – Sump Pump, Hatch, Ladder, Vent & Drain Piping, Piping Supports and Electrical System	1 (A – C)	LS	\$

(28) Grassing	1	ACRE	\$	\$
(29) Sodding	100	SY	\$	\$
(30) Silt Fence – Type A	20000	L.F.	\$	\$
(31) Construction Exit	1	LS	\$	\$
(32) Rip Rap	50	SY	\$	\$
(33) Pigs-In-A-Blanket	130	L.F.	\$	\$
(34) Safety Fencing				
A. Temporary Security Fence	300	L.F.	\$	\$
B. Barrier Fence (Orange)	1000	L.F.	\$	\$
(35) Trench Stabilization Beyond Bedding	200	CY	\$	\$
(36) Moving and Re-establishing Landscaping Features	5	EA	\$	\$
(37) Traffic Control	1	LS	\$	\$
(38) Cash Allowances				
A. Soil, Asphalt and Concrete Testing	1	LS	\$	\$30,000
B. Utility Conflict Resolution/Technical Issues	1	LS	\$	\$100,000
C. Construction Surveying	1	LS	\$	\$20,000
D. Blast Monitoring	1	LS	\$	\$15,000
E. Unforeseen Conditions	1	LS	\$	\$100,000
F. Unique Requirements	1	LS	\$	\$35,000

TOTAL ITEM (1) THROUGH ITEM (38) INCLUSIVE

The amount of _____ Dollars
 (\$_____)

The County will base their review on this bottom line figure as the total bid amount for this project. Please make sure that all line items are accurately calculated and total up to this inclusive amount.

The full name and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

NAME _____ ADDRESS _____

The Bidder shall list below work done of a similar nature to that Bid for, as references that will afford the Owner opportunity to judge as to experience, standing, and financial ability.

PROJECT NAME

OWNER'S NAME

OWNER'S
REPRESENTATIVE'S
TELEPHONE

END OF SECTION NO. 11

Part 1 General**1.01 Description**

- A. The Work to be performed under this Contract shall consist of furnishing all labor, materials, tools, equipment and incidentals and performing all Work required to construct complete in place and ready to perform the following:
1. Install approximately 16,180 linear feet of ductile iron pipe (DIP) water main as shown in the project drawings and as specified in the project specifications and details. Diameters will vary from 8 inch to 24 inch DIP.
 2. Install 16 inch diameter flow meter, SCADA system, and concrete enclosure vault, and all accessories.
 3. Reconnect residential and commercial service lines to new water mains.
 4. Add or remove and replace fire hydrants as indicated in the project drawings.
 5. Install all valve assemblies and connections to existing lines where indicated.
 6. Replace roadway surfaces, curb and gutter, sidewalks, roadway structures and driveways. Restore all disturbed ground surfaces.
 7. If necessary, prepare and submit traffic control plans to the County's Construction Manager.
 8. Install sedimentation and erosion control items as necessary. Remove after control of sediment and erosion runoff has been established.
 9. Make provisions for central construction worksite field office and storage area.
 10. Perform all duties necessary for construction cleanup, and project close out.
 11. Assist County and County's Design Engineer in the production of record as-built drawings.
 12. Locate all underground utilities prior to excavation activities.
 13. Provide services for testing of soil, and asphalt and cementitious concrete as required.
 14. Provide construction surveying as necessary.
- B. All Work described above shall be performed as shown on the Drawings and as specified.
- C. Contractor shall submit a project schedule including milestones for the substantial completion of work and the final completion of work in accordance with Section 01310, and dates for the submittals of shop drawings, product data and samples in accordance with Section 01340.

1.02 Project Location

The project is located along Riverside Road and Dogwood Road, Roswell, Georgia.

1.03**Quantities**

The Owner reserves the right to alter the quantities of work to be performed or to extend or shorten the improvements at any time when and as found necessary, and the Contractor shall perform the work as altered, increased or decreased. Payment for such increased or decreased quantity will be made in accordance with the Instructions to Bidders. No allowance will be made for any change in anticipated profits nor shall such changes be considered as waiving or invalidating any conditions or provisions of the Contract and Bond.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. The scope of this Section is to convey to the Contractor unique and unusual stipulations and requirements which have been established for this Project. Some of the stipulations and requirements are a result of negotiations with various entities and organizations which have an interest in this Project. Some requirements are based on technical aspects of the Project which are not otherwise conveyed to the Contractor. The provisions of this Section shall supersede the provisions of the Division 1 through 17 Specifications but shall not supersede the Bidding Requirements, Contract Forms or Conditions of the Contract.

1.02 CITY OF ROSWELL SPECIFICATIONS AND STANDARDS

- A. Existing pavement, sidewalks and curbs shall be replaced in accordance with the City of Roswell standards and specifications or to match existing conditions, whichever is more stringent.
- B. Construction of the meter vault near Don White Park will require the demolition and removal of the existing signage. The replacement sign is to be incorporated into the work of constructing the new meter vault. The design and landscaping of new signage is to be coordinated with and approved by the City of Roswell. All costs associated with the design, landscaping and replacement of the sign will be reimbursed from the Unique Requirements Allowance, section #0300 - item # 43 – F.
- C. The construction area at Don White Park for the new meter vault will be secured from public access by a 6 foot high chain link fence with lockable access gate.
- D. Disposal and related documentation of any asbestos cement (A/C) pipe removed from the Project shall be the responsibility of the Contractor. Disposal shall be in accordance with the regulations of the State of Georgia, in an approved landfill. Contractor shall provide proper documentation of disposal in accordance with Georgia EPD and other State of Georgia regulations. All costs associated with the documentation and disposal of A/C pipe will be reimbursed from the Unique Requirements Allowance, section #0300 - item # 43 –F.

1.03 EXISTING OPERATIONS

- A. The existing facilities and continuity of water service must of necessity be maintained during the time the investigation and construction activities are in progress.
- B. The Contractor shall coordinate the Work with the Owner so that the construction will not restrain or hinder the operation of the existing facilities. If, at any time, any portion of the facilities are out of service, the Contractor must obtain approval from the Owner representative Thomas Czczil at (770) 410-3421 as to the date, time and length of time that portion of the facilities are out of service until service is restored.
- C. After having coordinated the Work with the Owner, the Contractor shall prepare a submittal in accordance with Section 01340 that will include the time of day, length of outage and methods of each connection or alteration, and obtain approval of the Engineer of Record for the Project before any Work is undertaken on the connections or alterations.

- D. Before any roadway or facilities are blocked off, the Owner's, Construction Manager and City Of Roswell approval shall be obtained. The Contractor shall prepare a submittal in accordance with Section 1340 that will include the time of day , length blockage will occur, and alternate traffic routes or detours. This submittal will be approved by the Engineer of Record before any blockage occurs.

1.04 SEQUENCING

- A. General
 - 1. The Contractor shall be solely responsible for sequencing of all activities.
 - 2. The completion of specific preliminary sequencing tasks indicated will be required prior to any significant site construction activities.
- B. Contractor to provide written notification to the Owner at least 72 hours prior to starting work that will require taking existing components out of service.
- C. Sequence Submittal
 - 1. Submit a proposed sequence in accordance with Section 01340 with associated starting time and completion time of tasks to Construction Manager and Engineer of Record for review.
 - 2. The Contractor may propose alternatives to the sequencing constraints to that shown in this Section in an attempt to reduce the disruption of the operation of the existing facility or streamline the tasks of this Contract. The Owner and Engineer are not obligated to accept any of these suggested alternatives.

1.05 SEQUENCING CONSTRAINTS

- A. The following construction sequencing constraints are to emphasize critical tasks of the Work in this Contract. It is not a complete list of all work to be completed.
 - 1. All work and construction activities must remain within County easements or public right of way.
 - 2. Clearing and grubbing within the easement must be done in order to gain access to portions of the work area.
 - 3. Owner's approval of time and duration of any system outage.
 - 4. Owner's approval of Contractor' Traffic Management Plan.

1.06 CONTRACTOR'S SUPERINTENDENCE

- A. The CONTRACTOR shall submit, with the initial Detailed Construction Schedule, a detailed manpower organization chart indicating the management and supervisory personnel for the control and supervision of all aspects the WORKS. Particular reference must be made to those personnel proposed for overall project direction, co-ordination and programming roles. Only in exceptional circumstances will substitute candidates be allowed when work commences. Under these exceptional circumstances only a candidate may be submitted with equivalent or better experience.
- B. Particulars of nominees for all key positions shall be provided, including detailed resume, giving qualifications and previous experience. The key positions, which may be combined or separate, shall include:
 - 1. Project Director

2. Project Manager
 3. Site Safety Manager/Supervisor
 4. In general, managers shall have a minimum of five years experience and supervisors a minimum of three years experience.
- C. The organization chart shall be an accurate statement of the CONTRACTOR'S intention.

1.07 WORKING HOURS

- A. The CONTRACTOR'S representative on site directly responsible for the Work shall be immediately contact-able at any time during the normal working day and shall immediately respond to all or any query by the CONSTRUCTION MANAGER or Engineer of Record.
- B. Adequate means of communication by telephone, portable radio, CB, walkie-talkies, or other electronic means of communication must be established at all times as part of the routine work methodology and in case of an emergency, between all relevant points of any activity along the length of the sewer.
- C. Daytime working is defined as 0700 to 1900 hours. No work shall be carried out at any other time or on a bank holiday, including Saturday and Sunday, without permission in writing from the CONSTRUCTION MANAGER except when the work is unavoidable or absolutely necessary for the saving of life, property or for the safety of the works, in which case the CONTRACTOR shall immediately notify the CONSTRUCTION MANAGER of such works.
- D. Night work shall be defined as the period of 1900 to 0700 hours. All work areas are to be properly barricaded and lighted.
- E. Weekend working shall be defined as the period from 0700 hours Saturday to 0700 hours Monday.
- F. Work on principal highway routes shall be restricted to certain hours as directed by the CONSTRUCTION MANAGER. No work will be permitted outside these hours.
- G. Contractor will not be allowed to leave trenches or ditches open over night.

1.08 NOISE CONTROL

- A. The CONTRACTOR shall employ the "best practicable means" to minimize and mitigate noise as well as vibration resulting from operations. Mitigation measures shall include the utilization of sound suppression devices on all equipment and machinery particularly in residential areas and in the near vicinity of hospitals and schools, especially at night.
- B. Sound reduced equipment is defined as equipment which emits a sound pressure level exceeding 75dB(A) at 30-feet in any direction from the center of the machine if the equipment is to be used between the hours of 0700 and 1900, and 65 dB(A) if used outside those hours.
- C. The CONTRACTOR shall inform the CONSTRUCTION MANAGER before the commencement of the Works, or of any significant phase thereof, or immediately any change in the method of working not previously notified is affected.
- D. Any pumps, generators, combination cleaners or other noise emitting equipment shall be suitably screened to minimize nuisance and pollution.

- E. This shall not be taken as preventing or prohibiting the execution of works which are absolutely necessary for the saving of life or property or for the safety of the works. The use of machinery or equipment in an emergency situation shall be notified as soon as practicable to the CONSTRUCTION MANAGER

1.09 TRAFFIC MANAGEMENT

- A. The CONTRACTOR shall comply with the relevant provisions related to traffic control and safety published by Fulton County and the Georgia Department of Transportation. Note – asphalt overlay to one-half (one full lane) of street will be required on Indian Springs Drive, Riviera Drive, River Lake Drive, and North Springs Drive after installation of new 8-inch main and backfilling is completed as per Fulton County standards.
- B. The work shall be carried out so as not to interfere unnecessarily or improperly with the passage of pedestrians and vehicles or the access to use public or private roads; footpaths and properties.
- C. For work requiring occupation of the public highway the CONTRACTOR shall comply at all times with the requirements of the relevant Traffic Signs Manual concerning construction works in the highway. The CONTRACTOR shall supply and place and maintain warning signs to the satisfaction of the CONSTRUCTION MANAGER. These signs shall be removed when work is not in progress.
- D. The CONTRACTOR shall not commence any works which affect vehicular passage along the highway until details of all traffic management safety and control measures necessitated by the works have been submitted to the CONSTRUCTION MANAGER for consideration and are fully operational.
- E. If conditions are such that temporary traffic signals and signs, illuminated or otherwise, are necessary, then these will be provided and maintained by the CONTRACTOR.
- F. Where the volume of traffic on any road makes it impracticable or hazardous to carry out work during normal working hours, the CONTRACTOR shall apply to the CONSTRUCTION MANAGER for permission to work at night or weekends. The CONTRACTOR shall also make all necessary arrangements to enable work to be carried out at manholes which are covered by parked vehicles.
- G. Should the CONTRACTOR wish to divert traffic onto any temporary routes or to close a roadway or lane of traffic he shall submit any such request to CONSTRUCTION MANAGER at least 8 weeks in advance of the proposed diversion.
- H. The CONTRACTOR shall provide and allow for watching and lighting the site, provide safe passage to pedestrians and vehicular traffic at all times at no additional cost to the OWNER.
- I. If the use of traffic lights and associated signs is requested by Fulton County or requested by CONSTRUCTION MANAGER during the course of the work, then the CONTRACTOR shall make his own arrangements to provide these at no additional cost to the OWNER.
- J. The CONTRACTOR shall notify the local police of his presence when working on highways and shall keep the police aware of his appropriate area of working at all times. The CONTRACTOR shall make available to the police a telephone number of a person who may be contacted during the survey in order to resolve any queries.

- K. Where the volume of traffic or parked vehicles makes it impracticable or hazardous to carry out the work during normal working hours the CONTRACTOR shall apply to CONSTRUCTION MANAGER for permission to work outside of normal working hours.
- L. The CONTRACTOR shall comply with any special traffic requirements of Fulton County and any other municipality in which the work may be conducted.

1.10 WARRANTIES

For the purposes of this project the following assumptions shall be made by the Contractor:

- A. The warranty period against any defects being found in CONTRACTORS workmanship shall be two years.
- B. The warranty period against any shortcoming in material performance shall be five years.
- C. Warranty against sealants breaking down shall be given for a period of ten years.

OWNER reserves the right to inspect all Work areas at any time within twelve months of construction for defects in workmanship and effectiveness. If any form of defect is found then the CONTRACTOR shall carry out approved remedial work as directed by the Construction Manager. Payment may be either withheld from retention monies or other outstanding payments due to the contractor, whichever the CONSTRUCTION MANAGER deems appropriate in order to complete the remedial work.

END OF SECTION

Part 1 General**1.01 Partial Occupancy By Owner**

Whenever, in the opinion of the Engineer, any section or portion of the Work or any structure is in suitable condition, it may be put into use upon the written order of the Engineer and such usage will not be held in any way as an acceptance of said Work or structure, or any part thereof, or as a waiver of any of the provisions of these Specifications and the Contract. Pending final completion and acceptance of the Work, all necessary repairs and replacements, due to defective materials or workmanship or operations of the Contractor, for any section of the Work so put into use shall be performed by the Contractor at Contractor's own expense.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The Pricing Form (Bid) lists each item of the Project for which payment will be made. No payment will be made for any items listed in this section that are not listed in the Bid.
- B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid, and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid, shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit, shall be considered as included in the lump sum or unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.
- C. Work includes furnishing all plant, labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.02 Descriptions

- A. Measurement of an item of work will be by the unit indicated in the Bid.
- B. Payment will include all necessary and incidental related work not specified to be included in any other item of work listed in the Bid.
- C. Unless otherwise stated in individual sections of the Specifications or in the Bid, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work. The costs for all such items required shall be included in the price bid for item of which it is a part.
- D. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings.
- E. "Products" shall mean materials or equipment permanently incorporated into the work.

1.03 Erosion and Sedimentation Control

- A. General
 - 1. No separate payment shall be made for temporary and/or permanent erosion and sedimentation controls, except as noted below. All other temporary and/or permanent erosion and sedimentation control costs shall be included in the unit price bid for the item to which it pertains.
 - 2. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.

3. Quantities for payment shall be based upon actual quantity constructed by the Contractor.
- B. Construction Exits: All costs for construction exits, including installation, maintenance, repair, and removal, shall be included in the unit price bid for Construction Exits.
- C. Silt Fence: All costs for Type A silt fence, including installation, maintenance, repair, replacement, and removal, shall be included in the unit price bid for Silt Fence.
- D. Reinforced Silt Fence: All costs for Type C silt fence as shown on drawings or where ordered by the Engineer, including installation, maintenance, repair, replacement, and removal, shall be included in the unit price bid for Reinforced Silt Fence.
- E. Hay Bale Check Dams: All costs for hay bale check dams, including hay bales, necessary earthwork, periodic maintenance and repair, and removal of sediment and hay bales following establishment of permanent erosion control measures shall be included in the unit price bid for Hay Bale Check Dams.
- F. Stone Check Dams: All costs for stone check dams, including stone, necessary earthwork, periodic maintenance and repair, and removal of sediment and stone following establishment of permanent erosion control measures shall be included in the unit price bid for Stone Check Dam.
- G. Sediment Traps: All costs for temporary sediment traps (silt box), including installation, maintenance, repair and removal, shall be included in the unit price bid for Sediment Traps.
- H. Inlet Filters: All costs for inlet sediment traps (pigs in a blanket), including installation, maintenance, repair and removal, shall be included in the unit price bid for Inlet Filters.
- I. Rip Rap
 1. The cost of all rip rap, including filter fabric, shown on the Drawings, specified, or directed by the Engineer, shall be included in the unit price bid for Rip Rap.
 2. When crossing a stream or ditch, the quantity eligible for payment shall be limited to 10 feet upstream and 10 feet downstream from top of trench excavation and from five feet from top of bank, across a creek or ditch, banks and bottoms, to ten (10) feet beyond top of bank. Any other areas at creeks or ditches disturbed by the Contractor, which require rip rap, shall be rip rapped at no additional cost to the Owner.
- J. Temporary Stream Crossing: All costs for constructing temporary stream crossings, including temporary culverts, stone, necessary earthwork, periodic maintenance and repair, and removal of sediment and all materials placed by the Contractor, following the end of the usefulness of the temporary crossing, shall be included in the unit price bid for Temporary Stream Crossing.
- K. Pigs-in-a-blanket: Pigs-in-a-blanket are used for inlet sediment trap, as shown on the Drawings, specified or as directed by the Contractor. Payment shall be

measured based on quantity installed by linear foot. Unit price shall include fabric, blocks, wires and the furnishing of all labor, materials, equipment and tools necessary for installation, maintenance, and disposal of all wastes.

- L. Safety Fencing: Payment for safety fencing shall be made by the linear feet installed and by type. Unit price shall include costs to install, maintain, and remove.
- M. Grassing
 - 1. The unit price bid for Grassing shall be for one time clean up of the pipeline route and grassing, whether permanent, temporary, or both. Any other costs for labor, materials, and equipment for clean up and grassing of the disturbed area shall be included in the unit price bid for the item to which it pertains.
 - 2. No additional payment will be made for those lengths of pipeline where the Contractor must reseed due to inadequate watering and maintenance; loss of seeds caused by site erosion, e.g., wind and rain; inadequate germination of the seeds; inadequate coverage/density; providing permanent species at the appropriate season after temporary grassing has been performed.
 - 3. No additional payment will be made for providing a temporary species of grass where the seasonal limitations do not allow for the proper germination of a permanent species of grass. Any additional cost anticipated for sowing a temporary species shall be included in the price bid for the item to which it pertains.
 - 4. Measurement for payment for Grassing shall be based on the actual measured area disturbed by construction of the water main.
 - 5. No payment will be made for any length of water main where the clean up and grassing operation is not maintained within 2,000 feet of the pipe laying operation.
- N. Gabions: All costs for gabions including installation and maintenance shall be included in the unit price bid for Gabions.
- O. Sodding: Sodding, where ordered by the Engineer, shall be provided at the unit price bid for Sodding. Payment for sodding shall be in addition to the payment made for Grassing.
- P. Erosion Control Matting: All costs for Erosion Control Matting, including installation, maintenance, and repair, shall be included in the unit price bid for Erosion Control Matting.

1.04 Tree Removal and Protection

- A. Payment for Tree Removal shall be made for the tree removed within the permanent and construction easements limits only, where the tree, in the opinion of the Engineer is considered to be the area of water main installation. Trees removed outside the easement limits shall not be included unless directed by the Engineer.

- B. Tree removal shall include the off site disposal of materials which include all trees, stumps, roots, growth, debris and other objectionable matter.
- C. The cost of removing and reestablishing landscape features within the right-of-way and easements shall be included in the unity prices bid for Water Main.
- D. No separate payment will be made for tree protection fencing.

1.05 Water Mains and Accessories

- A. Owner Furnished Materials
 - 1. No additional payment shall be made on account of delays in delivery of materials furnished by the Owner.
 - 2. Any delivery waiting charges shall be paid by the Contractor.
 - 3. Should any material be damaged, lost or fail under test, and in the opinion of the Engineer, such failure or damage is the result of improper handling, it shall be replaced in kind by the Contractor at no cost to the Owner.
 - 4. No payment shall be made for receiving, handling and distributing materials furnished by the Owner.
 - 5. Fittings, solid sleeves and special bell pipe installed for the convenience of the Contractor, shall not be paid for by the Owner.
- B. Existing Utilities and Obstructions
 - 1. No separate payment will be made for any delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains or services shown or not shown on the Drawings.
 - 2. No separate payment will be made for reconnecting service lines (water, sewer, gas, etc.) that are damaged or disconnected as a result of construction.
 - 3. Horizontal Conflict: No separate payment shall be made for changing the horizontal alignment of the water main to avoid a horizontal conflict, except where authorized for additional fittings and/or pipe.
 - 4. Vertical Conflict: No separate payment shall be made for lowering the water main alignment to avoid a vertical conflict, except where authorized for additional fittings.
- C. Construction Along Highways, Streets and Roadways: No separate payment shall be made for traffic control or maintaining highways, streets, roadways and driveways.
- D. Location and Grade

1. No separate payment shall be made for any surveying performed by the Contractor to establish or confirm the location of reference points, right of ways or easements or location and grade of the water main.
 2. The "Construction Verification Surveying" cash allowance is solely for the use of the Engineer for verification of the Contractor's reference points, centerlines and work performed. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks or verifying that the work has been performed accurately.
- E. Laying and Jointing Pipe and Accessories
1. Payment for water main shall be made for the quantity provided. Measurement for payment shall be made along the centerline of the pipe, through valves and fittings. No payment shall be made for sections of pipe which are not installed.
 2. Fittings
 - a. The unit price bid for fittings shall include the costs of fittings and joint accessories and the cost of all related blocking. Weight of fittings for payment for diameters less than 54 inches shall be AWWA C 110 standard weight for all mechanical joint ends and shall not include the weight of bolts, glands, or cement lining.
 - b. Weight of fittings for payment for diameters 54 inches and larger shall be manufacturer's standard weight and shall not include weight of bolts, glands or cement lining.
 - c. Anchor couplings will be paid for at the unit price bid for fittings and shall not be included in the quantities measured for water main. Weight for payment of anchor couplings will be determined from the manufacturer's standard weight, including the coupling and rotating split gland.
 3. Fire Hydrants and Blow Offs
 - a. Payment for fire hydrants shall be made at the unit price bid. Payment for the associated valve and valve box will be included in the price bid for fire hydrant.
 - b. Payment for hydrant lead piping and blow off piping will be made at the unit price bid for 6 inch water main, except when anchor couplings are used. They shall be included for payment as fittings.
 - c. Fittings for blow off and air release hydrant leads will be paid for at the unit price bid for fittings.
 - d. Payment for relocating existing fire hydrants shall be made at the unit price bid for fire hydrants, "Relocate Existing". Payment shall include all costs associated with disconnecting and reinstalling the hydrant at the location shown on the Drawings.

- e. Payment for hydrant extension sections where the depth of bury of fire hydrants is greater than 4.5 feet shall be made to the nearest half foot at the unit price in the Bid. No distinction shall be made between the additional barrel lengths provided by measuring and ordering the proper depth of bury for the hydrants and the additional barrel length provided by adding extension kits after the hydrant is ordered.
 - 4. Valves
 - a. The unit price bid for valves shall include the cost of providing the valve, extension stem, valve box, valve marker, and all related items.
 - b. The cost for providing the flange by restrained joint adapters shall be included in the unit price bid for valves.
 - 5. The unit price bid for blow offs shall include the cost of providing the curb stop, valve box, valve marker, valve pad, meter box, galvanized steel pipe and other related items for a complete installation.
 - 6. No additional payment will be made for replacement of defective materials.
 - 7. Payment for polyethylene encasement shall be made at the unit price bid.
 - 8. No separate payment shall be made for detection tape or tracer wire.
 - 9. The unit price bid for air valves shall include the cost of providing the air valve, gate valve, tapping saddle and fittings, precast concrete product, frame and cover, crushed stone and all related items as shown on the Detail Drawings.
 - 10. No payment will be made for cutting and beveling pipe.
 - 11. Solid Sleeves: Payment for solid sleeves shown on the Drawings and specified shall be made at the unit price bid for fittings. No payment shall be made for fittings provided due to the Contractor's sequence of construction, layout problems or repairs, except for those shown on the Drawings or specified.
- E. Meter Vault
- 1. Payment for the meter vault shall be made at the unit price bid. The unit price shall include costs for providing all materials and labor necessary to install the meter vault, all equipment, instrumentation system, SCADA system, electrical system, all accessories and related items as shown on the Drawings
- F. Connections to Existing Pipe Lines
- 1. The unit price bid for tapping sleeves and valves shall include the cost of providing the sleeve, valve, extension stem, valve box, actual connection to water main, valve marker and related blocking and accessories.

2. The cost of all labor necessary for making the connection to existing pipelines with solid sleeves or a manner other than tapping sleeves and valves shall be included in the unit price bid for connections to existing water mains.
3. The cost for making connection to existing pipe lines with couplings, including furnishing the coupling, shall be included in the unit price bid for connections to existing water main.

G. Thrust Restraint

1. No separate payment will be made for retainer glands or harnessing.
2. Payment for thrust collars shall be made at the unit price bid. The unit price shall include all associated costs including concrete, reinforcing, forming and weld on collar.
3. Payment for concrete blocking shall be made at the unit price bid. Quantities shall be determined from the dimensions shown on the Drawings for each size and type of fitting for which blocking is installed. The Contractor shall bear all costs for quantities in excess of the scheduled amount, as may be required due to over excavation or other reasons.

H. Abandon Existing Water Main, Appurtenances and Fire Hydrants

1. Payment for abandoning existing mains shall be made at the unit price bid for cut, cap/plug and block existing water main. Payment shall include providing all materials and labor necessary to disconnect and plug the segment of water main to be abandoned and to provide the appropriate size cap or plug and concrete blocking to seal off and maintain the water main to remain in service as shown on the Drawings or as directed by the Engineer. Costs for disconnecting and plugging abandoned water mains at solid sleeve or coupling connections shall be included in the price bid for connection to existing water main.
2. Payment for removing and disposing of the existing abandoned pipe laying on the bank of Big Creek shall be made at the unit price bid. The unit price shall include costs for providing all materials and labor necessary to remove and transport off-site the abandoned pipe.
3. Payment for removing and disposing of the existing pressure regulator and vault shall be made at the unit price bid. The unit price shall include costs for providing all materials and labor necessary to remove and transport off-site the demolished pressure regulator and vault.
4. No additional payment shall be made for pavement removal and replacement associated with water main abandonment or salvaging of materials. The cost of such work and materials shall be included in related items.
5. Payment for removal and delivery of disconnected fire hydrants shall be made at the unit price bid.

- I. No separate payment will be made for the implementation of easement and permit stipulations.
- J. Clean-Up, Testing, and Disinfection

Payment for clean-up, testing, and disinfection shall be included in the unit price bid for the water main.

1.06 Water Service Changeovers

- A. Payment for water service changeovers shall include all work and materials associated with the service installation, including locating the existing service, abandoning the existing service line, any necessary boring and any associated pavement removal and replacement necessary to accomplish the work.
- B. Changeovers include providing the appropriate size corporation cock, copper tubing from the new main to the water meter, curb stop and miscellaneous items and fittings required to connect the existing water meter to the new water main as shown on the Drawings.
- C. Payment for Short Side service changeovers will be made for connecting to existing water meters located on the same side of the road or street as the new water main.
- D. Payment for Long Side service changeovers will be made for connecting to existing water meters located on the opposite side of the road or street as the new water main. No separate payment will be made for trenchless boring.
- E. The price bid for Water Meter Relocation will be made in addition to payment for either Short Side or Long Side service changeovers as appropriate. Water meter relocation shall include all additional work required beyond a short side or long side service changeover, including disconnecting the existing meter and pressure reducing valve, moving the meter, meter box and pressure reducing valve to the new location, reconnecting the meter and pressure reducing valve to the existing house service line, reinstalling the meter box and/or vault for the meter and providing a new meter box for the pressure reducing valve.
- F. The price bid for Pressure Reducing Valves shall include providing a new pressure reducing valve, as specified, for installation in conjunction with relocated water meters. New pressure reducing valves shall be provided only in the event that meters to be relocated do not have an existing pressure reducing valve.
- G. Polyvinyl Chloride (PVC) tubing shall be paid for at the price bid for the quantity installed. Polyvinyl Chloride (PVC) tubing shall be installed only where shown on the Drawings or specified to connect relocated meters to existing house service lines. Polyvinyl Chloride (PVC) tubing shall not be used to replace copper tubing specified which connects the new water main to existing or relocated meters.
- H. All costs associated with clean up, testing and disinfection of water services shall be included in the unit price bid for water services.

1.07 Bore and Jack Casings and Carrier Pipes

- A. Payment for casing shall be made only at the completion of all work specified for the casing installation. No partial payment shall be made for the construction of the casing.
- B. Casing pipe may be included in Partial Payment Requests as stored materials, if the casing pipe is stored at the Project site. Casing pipe which has been properly installed, but has not yet been paid for as installed casing, may also be included as stored materials.
- C. In the event that rock is encountered during the installation of the pipe casing which, in the opinion of the Engineer, cannot be removed through the casing, then the Engineer may authorize the Contractor to complete the crossing by another method via a change order.
- D. No additional payment shall be made for rock excavation through the casing .
- E. Payment for pipe in casing shall be made only at the completion of all work specified for the pipe installation. Payment for the casing pipe, the carrier pipe, spacers and grout in the casing shall be made only at the one unit price bid for the appropriate crossing.
- F. Payment for pipe in a free bore shall be made at the unit price bid for water main. Payment for free boring shall be made at the one unit price bid. Measurement for payment shall be made along the centerline of the water main from pavement edge to pavement edge of the crossing. Payment shall include all costs for free bore failures and the subsequent bore and jack required as well as for bore and jack casing if the Contractor elects to provide casing in lieu of free bore.

1.10 Open Cut Installation With Steel Casing

- A. Payment for installing steel casing in an open cut trench shall be made at the unit price bid for Open Cut Installation with Steel Casing, and shall include: labor, equipment, casing, supports, rout and accessories for installing casing and carrier pipe per details, and all other related work necessary for the completion of the work
- B. No additional payment shall be made for excavation, dewatering, shoring and backfilling.
- C. Payment for the casing pipe, the carrier pipe, spacers and grout in the casing shall be made only at the one unit price bid for the appropriate crossing.

1.11 Removing and Replacing Pavement

- A. Payment for removing and replacing pavement will be made as a separate item based on the measured quantity at the unit price in the Bid. The unit price shall include all costs associated with removing and replacing pavement, including providing select backfill if necessary, traffic control and temporary measures for maintaining traffic.
- B. Payment shall be made only for that length for which the pipeline is constructed underneath the pavement as shown on the Drawings.
- C. Payment for soils testing shall be made from the "soils and concrete testing" cash allowance. No payment shall be made for tests that fail to verify required results.

- D. No additional payment will be made for removing and replacing damaged adjacent pavement.
- E. No separate payment shall be made for pavement removal and replacement associated with abandonment of existing water mains or installation of water services.
- F. Payment for pavement resurfacing shall be made at the unit price bid. Limits eligible for payment shall be based on widths and lengths as shown on the Drawings. Measurement shall be made based on record drawing dimensions.
- G. Payment for pavement striping shall be made at the unit price bid. Limits eligible for payment shall be based on actual measured length of the striping. Measurement shall be made based on record drawing dimensions.

1.12 Remove and Replace Driveway

- A. Payment for removing and replacing driveways shall be made as a separate item based on the measured quantity replaced at the unit price bid for driveway type. The quantity shall be defined by the limits indicated in the Standard Details. The unit price shall include the furnishing of all labor, materials, tools and equipment necessary to complete the work as specified or as shown.
- B. Payment for soil, asphalt and concrete testing shall be made from the Task Allowances for Soil, Asphalt and Concrete Testing. No payment shall be made for tests which fail to verify required results.
- C. No additional payment will be made for removing and replacing damaged adjacent area of driveway caused by the Contractor.
- D. No additional payment shall be made for saw cutting driveways.

1.13 Remove and Replace Curb and Gutter

- A. Payment for removing and replacing curb and gutter shall be made as a separate item based on the measured quantity at the unit price bid for curb and gutter type. The quantity shall be defined by the limits indicated in the Standard Details.
- B. Payment for soil, asphalt and concrete testing shall be made from the Task Allowances for Soil, Asphalt and Concrete Testing. No payment shall be made for tests which fail to verify required results.
- C. No additional payment will be made for removing and replacing damaged adjacent curb and gutter caused by the Contractor.
- D. No additional payment shall be made for saw cutting curb and gutter.

1.14 Remove and Replace Concrete Sidewalk

- A. Payment for removing and replacing concrete sidewalk will be made as separate item based on the measured quantity at the unit price bid for Remove and Replace Concrete Sidewalk.
- B. The unit price for removing and replacing concrete sidewalk shall include removal and disposal of existing sidewalk, base, concrete, forms, curing and the

furnishing of all labor, materials, tools and appliances, and all related items necessary to complete the work.

- C. Payment for soil, asphalt and concrete testing shall be made from the Task Allowances for Soil, Asphalt and Concrete Testing. No payment shall be made for tests which fail to verify required results.

1.15 Storm Sewer/ Sanitary Sewer Protection

- A. No separate payment will be made for supporting existing storm or sanitary sewer pipe when installing water main crossing over or under storm or sanitary pipe. Cost for such work should be included in the unit price bid for water main.
- B. No separate payment will be made for removing and replacing existing storm or sanitary pipe for the purpose of ease in construction when installing water main. Cost of such work should be included in the unit price bid for water main.

1.16 Clearing and Grubbing

- A. Payment for clearing and grubbing will be made as separate item based on the measured quantity at the unit price bid for Clearing and Grubbing.
- B. Payment for moving and re-establishing landscaping features will be made as separate item based on the measured quantity at the unit price bid for Moving and Re-establishing Landscaping Features

1.17 Trench Excavation and Backfill

- A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with these Specifications, regulatory requirements, permits, laws or regulations which govern this Project.
- B. Trench Excavation: No separate payment will be made for trench excavation. All costs shall be included in the unit price bid for the item to which it.
- C. Sheet piling, Bracing and Shoring: No separate payment will be made for providing any sheet piling, bracing and shoring.
- D. Trench Rock Excavation
 - 1. Rock excavation shall be paid for as an extra in addition to payment for pipe excavation provided for elsewhere in these Specifications. Payment will be made for the measured quantity of rock excavated, at the sum of the unit prices for Trench Rock Base Cost and Trench Rock Premium Cost.
 - 2. The unit price for Trench Rock Base Cost is for the normally anticipated cost of rock excavation, the cost of additional bedding and backfill material as specified and all costs incidental thereto.
 - 3. The unit price bid for Trench Rock Premium Cost shall be for all additional costs for rock excavation which, in the opinion of the Contractor, are in excess of the Base Cost, including but not limited to extra blasting protection, closer grouping of blasting holes, more detonator caps, more caution, etc. The Contractor shall not bid less than

zero (bid a deduct) for the Trench Rock Premium Cost. Any Bids containing a deduct will be declared non-responsive and rejected by the Owner.

4. The maximum allowable volume of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 18 inches, but not less than 36 inches, and depth of rock on the pipe centerline, from the top of the rock to the bottom of the rock or the specified bottom of the trench, whichever has the higher elevation.
 5. The Engineer must be given reasonable notice to measure all rock.
 6. No allowance shall be made for excavating to extra widths for construction of manholes or other appurtenances, for excavating to sloping sides, or for excavations made necessary by the physical limitations of the Contractor's equipment. Cost of such additional rock excavation shall be included in the unit price bid for the item to which it pertains.
 7. Payment for blasting monitoring shall be made from the "Blasting Monitoring" cash allowance. A fee must be agreed upon by the Engineer prior to the Contractor employing an independent, qualified specialty subcontractor to monitor the blasting. If the Contractor employs the specialty subcontractor prior to the Engineer's approval of the fee, all such costs are subject to non reimbursement.
- E. Dewatering Excavations: All costs of equipment, labor and materials required for dewatering shall be included in the price bid for the item to which it pertains.
- F. Trench Foundation and Stabilization
1. No payment for trench stabilization shall be authorized until after the trench has been dewatered. If the pipe is installed in an inadequately prepared trench bottom, the Engineer shall notify the Contractor in writing of the deficiency and will not authorize payment for that portion of that length of pipe which was improperly installed.
 2. Payment for trench stabilization shall be made on the basis of the amount authorized and the unit price bid for Beyond Bedding under Trench Stabilization. Payment shall include all costs for the removal and disposal of the unsuitable material and replacement with crushed stone. No additional payment will be made for material required for specified bedding.
 3. No separate payment shall be made for filter fabric used under trench stabilization.
- G. Bedding and Haunching
1. No separate payment will be made for material used to provide specified bedding. The cost of all bedding materials shall be included in the unit price bid for the item to which it relates, except for trench stabilization.
 2. Payment for the additional costs of providing Type 4 or Type 5 bedding shown on the Drawings, specified or ordered by the Engineer shall be made at the unit price bid for Trench Stabilization.

3. The cost for providing Type 3 bedding for restrained joint pipe shall be included in the unit price bid for restrained joint pipe.
4. No additional payment will be made for improved bedding required to compensate for over excavation of the trench.

H. Initial Backfill

1. No separate payment shall be made for initial backfill.
2. No separate payment shall be made for drying out the initial backfill material in order to meet the compaction requirements.
3. No separate payment shall be made for the adding of moisture to the initial backfill materials in order to meet the compaction requirements.
4. No separate payment shall be made for providing select material if the insitu material cannot meet the compaction requirements.

I. Concrete Encasement: Payment for concrete encasement shall be at the unit price in the Bid.

J. Final Backfilling

1. Additional Material: No separate payment will be made for additional earth or fill materials imported to the Project site.
2. No additional payment will be made for additional material when excavated materials are used.
3. No separate payment shall be made for drying out the final backfill material in order to meet the compaction requirements.
4. No separate payment shall be made for the adding of moisture to the final backfill materials in order to meet the compaction requirements.
5. No additional payment will be made for providing select material if the insitu material cannot meet the compaction requirements.

1.18 Cash Allowances

A. General

1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.
2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition. The Contractor shall

make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.

3. No payment shall be provided for services that fail to verify required results.
- B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.
- C. Documentation
 1. Submit copies of the invoices with each periodic payment request from the firm providing the services.
 2. Submit results of services provided which verify required results.
- D. Schedule of Cash Allowances
 1. Soils and Concrete Testing: Allow the amount provided in the Bid for the services of a geotechnical engineering firm and testing laboratory to verify soils conditions including trench excavation and backfill, and similar issues and for the testing of concrete cylinders for poured in place concrete.
 2. Materials Testing: Allow the amount provided in the Bid for the services of a testing laboratory for the testing of materials to be furnished on the Project, e.g., ductile iron pipe.
 3. Construction Verification Surveying
 - a. Allow the amount provided in the Bid for construction surveying by an independent surveying firm, selected by the Owner, to perform horizontal and vertical alignment checks at the discretion of the Engineer.
 - b. This allowance is solely for the use of the Engineer for verification of the Contractor's reference points, centerlines and work performed. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks or verifying that the work has been performed accurately.
 4. Blasting Monitoring: Allow the amount provided in the Bid for the services of an independent, qualified specialty subcontractor to monitor the blasting, when directed by the Engineer.

END OF SECTION

Part 1 General**1.01 Scope**

- A. Construction staking shall include all of the surveying work required to layout the Work and control the location of the finished Project. The Contractor shall have the full responsibility for constructing the Project to the correct horizontal and vertical alignment, as shown on the Drawings, as specified, or as ordered by the Engineer. The Contractor shall assume all costs associated with rectifying work constructed in the wrong location.
- B. From the information shown on the Drawings and the information to be provided as indicated under Project Conditions below, the Contractor shall:
 - 1. Be responsible for setting reference points and/or offsets, establishment of baselines, and all other layout, staking, and all other surveying required for the construction of the Project.
 - 2. Safeguard all reference points, stakes, grade marks, horizontal and vertical control points, and shall bear the cost of re establishing same if disturbed.
 - 3. Stake out the permanent and temporary easements or the limits of construction to ensure that the Work is not deviating from the indicated limits.
 - 4. Be responsible for all damage done to reference points, baselines, center lines and temporary bench marks, and shall be responsible for the cost of re establishment of reference points, baselines, center lines and temporary bench marks as a result of the operations.
- C. Baselines shall be defined as the line to which the location of the Work is referenced, i.e., edge of pavement, road centerline, property line, right of way or survey line.
- D. Record Drawing surveys shall be performed in accordance with Section 01720 of these Specifications.

1.02 Project Conditions

- A. The Drawings provide the location and/or coordinates of principal components of the Project. The alignment of some components of the Project may be indicated in the Specifications. The Engineer may order changes to the location of some of the components of the Project or provide clarification to questions regarding the correct alignment.
- B. The survey points, control points, and baseline to be provided to the Contractor shall be limited to only that information which can be found on the Project site by the Contractor.
- C. A boundary and topographic survey is included on the Drawings.

1.03 Quality Assurance

- A. The Contractor shall furnish documentation, prepared by a surveyor currently registered in the State of Georgia, confirming that staking is being done to the

horizontal and vertical alignment shown in the Contract Documents. This requires that the Contractor hire, at the Contractor's own expense, a currently registered surveyor, acceptable to the Owner, to provide ongoing construction staking or confirmation of such.

- B. Any deviations from the Drawings shall be confirmed by the Engineer prior to construction of that portion of the Project.
- C. Quantities for payments measured under this Contract shall be certified by the registered surveyor.
- D. Construction Verification Surveying Cash Allowance
 - 1. This cash allowance is solely for the use of the Engineer for verification of the Contractor's reference points, centerlines and work performed and is not to be used by the Contractor to provide cut sheets.
 - 2. The presence of this cash allowance in no way relieves the Contractor of the responsibility of installing reference points, centerlines, temporary bench marks, verifying that the work has been performed accurately, and all other work covered by this Section.

1.04 Water Mains and Accessories

- A. Staking Precision: The precision of construction staking required shall be that which the correct location of the water main can be established for construction and verified by the Engineer. Where the location of components of the water main, e.g. fittings, valves, road crossings and are not dimensioned, the establishment of the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks, e.g., survey reference points, power poles, manholes, etc.
- B. Reference Points
 - 1. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right of way. The location of the reference points shall be recorded in a log with a copy provided to the Engineer for use, prior to verifying reference point locations. Distances shall be accurately measured to 0.01 foot.
 - 2. The Contractor shall give the Engineer reasonable notice that reference points are set. The reference point locations must be verified by the Engineer prior to commencing clearing and grubbing operations.

END OF SECTION

Part 1 General**1.01 Scope**

- A. Permits and Responsibilities: The Contractor shall, without additional expense to the Owner, be responsible for obtaining all necessary licenses and permits, including building permits, and for complying with any applicable federal, state, county and municipal laws, codes and regulations, in connection with the prosecution of the Work.
- B. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the public and the property of others.
- C. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the Work, except for any completed unit of construction thereof which may heretofore have been accepted.

END OF SECTION

Part 1 General**1.01 Description**

- A. Whenever reference is made to conforming to the standards of any technical society, organization, body, code or standard, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the time of advertisement for Bids. This shall include the furnishing of materials, testing of materials, fabrication and installation practices. In those cases where the Contractor's quality standards establish more stringent quality requirements, the more stringent requirement shall prevail. Such standards are made a part hereof to the extent which is indicated or intended.
- B. The inclusion of an organization under one category does not preclude that organizations' standards from applying to another category.
- C. In addition, all work shall comply with the applicable requirements of local codes, utilities and other authorities having jurisdiction.
- D. All material and equipment, for which a UL Standard, an AGA or NSF approval or an ASME requirement is established, shall be so approved and labeled or stamped. The label or stamp shall be conspicuous and not covered, painted, or otherwise obscured from visual inspection.
- E. The standards which apply to this Project are not necessarily restricted to those organizations which are listed in Article 1.02.

1.02 Standard Organizations**A. Piping and Valves**

ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
CISPI	Cast Iron Soil Pipe Institute
DIPRA	Ductile Iron Pipe Research Association
FCI	Fluid Controls Institute
MSS	Manufacturers Standardization Society
NCPI	National Clay Pipe Institute
NSF	National Sanitation Foundation
PPI	Plastic Pipe Institute
Uni Bell PVC Pipe Association	

B. Materials

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials

C. Painting and Surface Preparation

NACE	National Association of Corrosion Engineers
SSPC	Steel Structures Painting Council

D. Electrical and Instrumentation

AEIC	Association of Edison Illuminating Companies
AIEE	American Institute of Electrical Engineers
EIA	Electronic Industries Association
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	ISA – The Instrumentation, Systems, and Automation Society
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
REA	Rural Electrification Administration
TIA	Telecommunications Industries Association
UL	Underwriter's Laboratories
VRCI	Variable Resistive Components Institute

E. Aluminum

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association

F. Steel and Concrete

ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
CRSI	Concrete Reinforcing Steel Institute
NRMA	National Ready Mix Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

G. Welding

ASME	American Society of Mechanical Engineers
AWS	American Welding Society

H. Government and Technical Organizations

AIA	American Institute of Architects
APHA	American Public Health Association
APWA	American Public Works Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
CFR	Code of Federal Regulations
CSI	Construction Specifications Institute
EDA	Economic Development Administration
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FmHA	Farmers Home Administration

FS	Federal Specifications
IAI	International Association of Identification
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
NBFU	National Board of Fire Underwriters
(NFPA)	National Fluid Power Association
NBS	National Bureau of Standards
NISO	National Information Standards Organization
OSHA	Occupational Safety and Health Administration
SI	Salt Institute
SPI	The Society of the Plastics Industry, Inc.
USDC	United States Department of Commerce
WEF	Water Environment Federation

I. General Building Construction

AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AITC	American Institute of Timber Construction
APA	American Parquet Association, Inc.
APA	American Plywood Association
BHMA	Builders Hardware Manufacturers Association
BIFMA	Business and Institutional Furniture Manufacturers Association
DHI	Door and Hardware Institute
FM	Factory Mutual Fire Insurance Company
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
IME	Institute of Makers of Explosives
ISANTA	International Staple, Nail and Tool Association
ISDSI	Insulated Steel Door Systems Institute
IWS	Insect Screening Weavers Association
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NAGDM	National Association of Garage Door Manufacturers
NCCLS	National Committee for Clinical Laboratory Standards
NFPA	National Fire Protection Association
NFSA	National Fertilizer Solutions Association
NKCA	National Kitchen Cabinet Association
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
RMA	Rubber Manufacturers Association
SBC	SBCC Standard Building Code
SDI	Steel Door Institute
SIA	Scaffold Industry Association
SMA	Screen Manufacturers Association
SPRI	Single Ply Roofing Institute
TCA	Tile Council of America
UBC	Uniform Building Code

J. Roadways

AREA	American Railway Engineering Association
DOT	Department of Transportation
SSRBC	Standard Specifications for Construction of Transportation Systems, Georgia Department of Transportation

K. Plumbing

AGA	American Gas Association
NSF	National Sanitation Foundation
PDI	Plumbing Drainage Institute
SPC	SBCC Standard Plumbing Code

L. Refrigeration, Heating, and Air Conditioning

AMCA	Air Movement and Control Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
CGA	Compressed Gas Association
CTI	Cooling Tower Institute
HEI	Heat Exchange Institute
IIAR	International Institute of Ammonia Refrigeration
NB	National Board of Boilers and Pressure Vessel Inspectors
PFMA	Power Fan Manufacturers Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMC	SBCC Standard Mechanical Code
TEMA	Tubular Exchangers Manufacturers Association

M. Equipment

AFBMA	Anti Friction Bearing Manufacturers Association, Inc.
AGMA	American Gear Manufacturers Association
ALI	Automotive Lift Institute
CEMA	Conveyor Equipment Manufacturers Association
CMAA	Crane Manufacturers Association of America
DEMA	Diesel Engine Manufacturers Association
MMA	Monorail Manufacturers Association
OPEI	Outdoor Power Equipment Institute, Inc.
PTI	Power Tool Institute, Inc.
RIA	Robotic Industries Association
SAMA	Scientific Apparatus Makers Association

1.03 Symbols

Symbols and material legends shall be as scheduled on the Drawings.

END OF SECTION

Part 1 General**1.01 Scope**

- A. Work under this Section includes all scheduling and administering of pre construction and progress meetings as herein specified and necessary for the proper and complete performance of this Work.
- B. Scheduling and Administration by Engineer:
 - 1. Prepare agenda.
 - 2. Make physical arrangements for the meetings.
 - 3. Preside at meetings.
 - 4. Record minutes and include significant proceedings and decisions.
 - 5. Distribute copies of the minutes to participants.

1.02 Preconstruction Conference

- A. The Engineer shall schedule the preconstruction conference prior to the issuance of the Notice to Proceed.
- B. Representatives of the following parties are to be in attendance at the meeting:
 - 1. Owner.
 - 2. Engineer.
 - 3. Contractor and superintendent.
 - 4. Major subcontractors.
 - 5. Representatives of governmental or regulatory agencies when appropriate.
- C. The agenda for the preconstruction conference shall consist of the following as a minimum:
 - 1. Distribute and discuss a list of major subcontractors and a tentative construction schedule.
 - 2. Critical work sequencing.
 - 3. Designation of responsible personnel and emergency telephone numbers.
 - 4. Processing of field decisions and change orders.
 - 5. Adequacy of distribution of Contract Documents.
 - 6. Schedule and submittal of shop drawings, product data and samples.
 - 7. Pay request format, submittal cutoff date, pay date and retainage.

8. Procedures for maintaining record documents.
9. Use of premises, including office and storage areas and Owner's requirements.
10. Major equipment deliveries and priorities.
11. Safety and first aid procedures.
12. Security procedures.
13. Housekeeping procedures.
14. Work hours.

1.03 Project Coordination Meetings

- A. Schedule regular monthly meetings as directed by the Engineer. Additional meetings may be requested at any time at the discretion of the Owner, Engineer or Contractor. The party requesting a meeting shall provide the other two parties with as much notice as possible, as well as a written agenda for such meeting.
- B. Hold called meetings as the progress of the Work dictates.
- C. The meetings shall be held at the location indicated by the Engineer.
- D. Representatives of the following parties are to be in attendance at the meetings:
 1. Engineer.
 2. Contractor and superintendent.
 3. Major subcontractors as pertinent to the agenda.
 4. Owner's representative as appropriate.
 5. Representatives of governmental or other regulatory agencies as appropriate.
- E. The minimum agenda for progress meetings shall consist of the following:
 1. Review and approve minutes of previous meetings.
 2. Review work progress since last meeting.
 3. Note field observations, problems and decisions.
 4. Identify problems which impede planned progress.
 5. Review off site fabrication problems.
 6. Review Contractor's corrective measures and procedures to regain plan schedule.

7. Review Contractor's revision to the construction schedule as outlined in the Supplementary Conditions.
8. Review submittal schedule; expedite as required to maintain schedule.
9. Maintenance of quality and work standards.
10. Review changes proposed by Owner for their effect on the construction schedule and completion date.
11. Complete other current business.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work under this Section includes preparing, furnishing, distributing, and periodic updating of the construction schedules as specified herein.
- B. The purpose of the schedule is to demonstrate that the Contractor can complete the overall Project within the Contract Time and meet all required interim milestones.

1.02 Submittals

- A. Overall Project Schedule (OPS)
 - 1. Submit the schedule within 10 days after date of the Notice to Proceed.
 - 2. The Engineer will review the schedule and return it within 10 days after receipt.
 - 3. If required, resubmit within 10 days after receipt of a returned copy.
- B. Near Term Schedule (NTS)
 - 1. Submit the first Near Term Schedule within 10 days of the Notice to Proceed.
 - 2. The Engineer will review the schedule and return it within 10 days after receipt.
- C. Submit an update of the OPS and NTS with each progress payment request.
- D. Submit the number of copies required by the Contractor, plus four copies to be retained by the Engineer.

1.03 Approval

Approval of the Contractor's detailed construction program and revisions thereto shall in no way relieve the Contractor of any of Contractor's duties and obligations under the Contract. Approval is limited to the format of the schedule and does not in any way indicate approval of, or concurrence with, the Contractor's means, methods and ability to carry out the Work.

1.04 Overall Project Schedule (OPS)

- A. The Contractor shall submit to the Owner for approval a detailed Overall Project Schedule of the Contractor's proposed operations for the duration of the Project. The OPS shall be in the form of a Gantt/bar chart.
- B. Gantt/Bar Chart Schedule
 - 1. Each activity with a duration of five or more days shall be identified by a separate bar. Activities with a duration of more than 20 days shall be sub divided into separate activities.

2. The schedule shall include activities for shop drawing preparation and review, fabrication, delivery, and installation of major or critical path materials and equipment items.
3. The schedule shall show the proposed start and completion date for each activity. A separate listing of activity start and stop dates and working day requirements shall be provided unless the information is shown in text form on the Gantt/bar chart.
4. The schedule shall identify the Notice to Proceed date, the Contract Completion date, major milestone dates, and a critical path.
5. The schedule shall be printed on a maximum 11 x 17 inch size paper. If the OPS needs to be shown on multiple sheets, a simplified, one page, summary bar chart showing the entire Project shall be provided.
6. The schedule shall have a horizontal time scale based on calendar days and shall identify the Monday of each week.
7. The schedule shall show the precedence relationship for each activity.

1.05 Near Term Schedule (NTS)

- A. The Contractor shall develop and refine a detailed Near Term Schedule showing the day to day activities with committed completion dates which must be performed during the upcoming 30 day period. The detailed schedule shall represent the Contractor's best approach to the Work which must be accomplished to maintain progress consistent with the Overall Project Schedule.
- B. The Near Term Schedule shall be in the form of Gantt/bar chart and shall include a written narrative description of all activities to be performed and describe corrective action to be taken for items that are behind schedule.

1.06 Updating

- A. Show all changes occurring since previous submission of the updated schedule.
- B. Indicate progress of each activity and show actual completion dates.
- C. The Contractor shall be prepared to provide a narrative report at the Project Coordination Meetings. The report shall include the following:
 1. A description of the overall Project status and comparison to the OPS.
 2. Identify activities which are behind schedule and describe corrective action to be taken.
 3. A description of changes or revisions to the Project and their effect on the OPS.
 4. A description of the Near Term Schedule of the activities to be completed during the next 30 days. The report shall include a description of all activities requiring participation by the Engineer and/or Owner.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The Contractor shall furnish all equipment and labor materials required to provide the Owner with digital construction videos and photographs of the Project. Photographs and videos shall be provided on a compact disk, in DVD format.
- B. Photo and video files shall become the property of the Owner and none of the videos or photographs herein shall be published without express permission of the Owner.

1.02 Pre and Post Construction Videos and Photographs

- A. Prior to the beginning of any work, the Contractor shall take project [videos and] photographs of the work area to record existing conditions.
- B. Following completion of the work, [another recording and] photos shall be made showing the same areas and features as in the pre construction [videos and] photographs.
- C. All conditions which might later be subject to disagreement shall be shown in sufficient detail to provide a basis for decisions.
- D. The pre construction [videos and] photographs shall be submitted to the Engineer within 25 calendar days after the date of receipt by the Contractor of Notice to Proceed. Post construction [videos and] photographs shall be provided prior to final acceptance of the project.

1.03 Progress Photographs and Submittals

- A. Progress photograph files shall be provided on compact discs as well as hard copies.
- B. The file name of each photograph shall at a minimum contain the date the photograph was taken. All photographs shall be labeled to indicate date, time taken, and description of work shown.
- C. A minimum of 10 photographs shall be submitted with each request for payment. The view selection will be as agreed to with the Engineer. One copy of each photograph shall be submitted. Failure to include photographs may be cause for rejection of the payment request.
- D. Videos shall be submitted with a log of the items recorded, referenced to stations and property identification numbers.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work under this Section includes submittal to the Engineer of shop drawings, product data and samples required by the various sections of these Specifications.
- B. Submittal Contents: The submittal contents required are specified in each section.
- C. Definitions: Submittals are categorized as follows:
 - 1. Shop Drawings
 - a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.
 - b. Provide newly prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note dimensions that are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawings to be used in connection with the Work without appropriate final "Action" markings by the Engineer.
 - c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, specification section, schedule or room numbers shown on the Contract Drawings.
 - d. Minimum assembly drawings sheet size shall be 24 x 36 inches.
 - e. Minimum detail sheet size shall be 8 1/2 x 11 inches.
 - f. Minimum Scale:
 - i. Assembly Drawings Sheet, Scale: 1 inch = 30 feet.
 - ii. Detail Sheet, Scale: 1/4 inch = 1 foot.
 - 2. Product Data
 - a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.

- b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.
 3. Samples
 - a. Samples include both fabricated and un fabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.
 - b. Provide units identical with final condition of proposed materials or products for the work. Include "range" samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the Engineer's selection is required. Prepare samples to match the Engineer's sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by the Engineer. Engineer will note "test" samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the Contractor.
 4. Miscellaneous submittals related directly to the Work (non administrative) i.e., maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

1.02 Specific Category Requirements

- A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:
 1. The date of submittal and the dates of any previous submittals.
 2. The Project title.
 3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.
 4. The Names of:
 - a. Contractor

- b. Supplier
- c. Manufacturer
- 5. Identification of the product, with the Specification section number, permanent equipment tag numbers and applicable Drawing No.
- 6. Field dimensions, clearly identified as such.
- 7. Relation to adjacent or critical features of the Work or materials.
- 8. Applicable standards, such as ASTM or Federal Specification numbers.
- 9. Notification to the Engineer in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.
- 10. Identification of revisions on resubmittals.
- 11. An 8 x 3 inch blank space for Contractor and Engineer stamps.
- 12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the Work and of Contract Documents.
- 13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which review is requested crossed out.

1.03 Routing of Submittals

- A. Submittals and routine correspondence shall be routed as follows:
 - 1. Supplier to Contractor (through representative if applicable)
 - 2. Contractor to Engineer
 - 3. Engineer to Contractor and Owner
 - 4. Contractor to Supplier

Part 2 Products

2.01 Shop Drawings

- A. Unless otherwise specifically directed by the Engineer, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the Work.
- B. Submit all shop drawings in the form of six hard copies and one pdf file.
- C. One reproducible for all submittals larger than 11 x 17 inches and no more than three prints of other submittals will be returned to the Contractor.

2.02 Manufacturer's Literature

- A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the Engineer's review.
- B. Submit the number of copies which are required to be returned (not to exceed three) plus three copies which will be retained by the Engineer.

2.03 Samples

- A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.
- B. Unless otherwise specifically directed by the Engineer, all samples shall be of the precise article proposed to be furnished.
- C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the Engineer.

2.04 Colors

- A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the Engineer for review and selection.
- B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

Part 3 Execution

3.01 Contractor's Coordination of Submittals

- A. Prior to submittal for the Engineer's review, the Contractor shall use all means necessary to fully coordinate all material, including the following procedures:
 - 1. Determine and verify all field dimensions and conditions, catalog numbers and similar data.
 - 2. Coordinate as required with all trades and all public agencies involved.
 - 3. Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.
 - 4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.
- B. Each and every copy of the shop drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement.
- C. The Owner may back charge the Contractor for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a "No Exceptions Taken" mark.

D. Grouping of Submittals

1. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items.
2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the Engineer along with Contractor's comments as to compliance, non compliance or features requiring special attention.

E. Schedule of Submittals

1. Within 30 days of Contract award and prior to any shop drawing submittal, the Contractor shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated. A reasonable period shall be scheduled for review and comments. Time lost due to unacceptable submittals shall be the Contractor's responsibility and some time allowance for resubmittal shall be provided. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

3.02 Timing of Submittals

- A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.
- B. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal.

3.03 Reviewed Shop Drawings**A. Engineer Review**

1. Allow a minimum of 30 days for the Engineer's initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of two weeks for reprocessing each submittal. Advise the Engineer on each submittal as to whether processing time is critical to progress of the Work, and therefore the Work would be expedited if processing time could be foreshortened.
2. Acceptable submittals will be marked "No Exceptions Taken". A minimum of three copies will be retained by the Engineer for Engineer's and the Owner's use and the remaining copies will be returned to the Contractor.
3. Submittals requiring minor corrections before the product is acceptable will be marked "Make Corrections Noted". The Contractor may order, fabricate and ship the items included in the submittals, provided the

indicated corrections are made. Drawings must be resubmitted for review and marked "No Exceptions Taken" prior to installation or use of products.

4. Submittals marked "Amend and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.
 5. The "Rejected See Remarks" notation is used to indicate products which are not acceptable. Upon return of a submittal so marked, the Contractor shall repeat the initial review procedure utilizing acceptable products.
 6. Only two copies of items marked "Amend and Resubmit" and "Rejected See Remarks" will be reviewed and marked. One copy will be retained by the Engineer and the other copy with all remaining unmarked copies will be returned to the Contractor for resubmittal.
- B. No work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" notation. The Contractor shall maintain at the job site a complete set of shop drawings bearing the Engineer's stamp.
- C. Substitutions: In the event the Contractor obtains the Engineer's approval for the use of products other than those which are listed first in the Contract Documents, the Contractor shall, at the Contractor's own expense and using methods approved by the Engineer, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.
- D. Use of the "No Exceptions Taken" notation on shop drawings or other submittals is general and shall not relieve the Contractor of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents. The Engineer's review shall not relieve the Contractor of responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

3.04 Resubmission Requirements

- A. Shop Drawings
1. Revise initial drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.
 2. Indicate on drawings all changes which have been made other than those requested by the Engineer.
- B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

END OF SECTION

Part 1 General**1.01 Scope**

- A. This Section includes testing which the Owner may require, beyond that testing required of the manufacturer, to determine if materials provided for the Project meet the requirements of these Specifications.
- B. This work also includes all testing required by the Owner to verify work performed by the Contractor is in accordance with the requirements of these Specifications, i.e., concrete strength and slump testing, soil compaction, etc.
- C. This work does not include materials testing required in various sections of these Specifications to be performed by the manufacturer, e.g., testing of pipe.
- D. The testing laboratory or laboratories will be selected by the Owner. The testing laboratory or laboratories will work for the Owner.

1.02 Payment for Testing Services

- A. The cost of testing services required by the Contract to be provided by the Contractor shall be paid for by the Owner through the CASH ALLOWANCE, i.e., concrete testing, soil compaction, and asphalt testing.
- B. The cost of additional testing services not specifically required in the Specifications, but requested by the Owner or Engineer, shall be paid for by the Owner through the CASH ALLOWANCE.
- C. The cost of material testing described in various sections of these Specifications or as required in referenced standards to be provided by a material manufacturer, shall be included in the price bid for that item and shall not be paid for by the Owner.
- D. The cost of retesting any item that fails to meet the requirements of these Specifications shall be paid for by the Contractor. Retesting shall be performed by the testing laboratory working for the Owner.

1.03 Laboratory Duties

- A. Cooperate with the Owner, Engineer and Contractor.
- B. Provide qualified personnel promptly on notice.
- C. Perform specified inspections, sampling and testing of materials.
 - 1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
 - 2. Ascertain compliance with requirements of the Contract Documents.
- D. Promptly notify the Engineer and Contractor of irregularity or deficiency of work which are observed during performance of services.
- E. Promptly submit three copies (two copies to the Engineer and one copy to the Contractor) of report of inspections and tests in addition to those additional copies required by the Contractor with the following information included:

1. Date issued
 2. Project title and number
 3. Testing laboratory name and address
 4. Name and signature of inspector
 5. Date of inspection or sampling
 6. Record of temperature and weather
 7. Date of test
 8. Identification of product and Specification section
 9. Location of Project
 10. Type of inspection or test
 11. Results of test
 12. Observations regarding compliance with the Contract Documents
- F. Perform additional services as required.
- G. The laboratory is not authorized to release, revoke, alter or enlarge on requirements of the Contract Documents, or approve or accept any portion of the Work.

1.04 Contractor Responsibilities

- A. Cooperate with laboratory personnel, provide access to Work and/or manufacturer's requirements.
- B. Provide to the laboratory, representative samples, in required quantities, of materials to be tested.
- C. Furnish copies of mill test reports.
- D. Furnish required labor and facilities to:
1. Provide access to Work to be tested;
 2. Obtain and handle samples at the site;
 3. Facilitate inspections and tests;
 4. Build or furnish a holding box for concrete cylinders or other samples as required by the laboratory.
- E. Notify the laboratory sufficiently in advance of operation to allow for the assignment of personnel and schedules of tests.
- F. Laboratory Tests: Where such inspection and testing are to be conducted by an independent laboratory agency, the sample(s) shall be selected by such

laboratory or agency, or the Engineer, and shipped to the laboratory by the Contractor at Contractor's expense.

- G. Copies of all correspondence between the Contractor and testing agencies shall be provided to the Engineer.

1.05 Quality Assurance

Testing shall be in accordance with all pertinent codes and regulations and with procedures and requirements of the American Society for Testing and Materials (ASTM).

1.06 Product Handling

Promptly process and distribute all required copies of test reports and related instructions to insure all necessary retesting or replacement of materials with the least possible delay in the progress of the Work.

1.07 Furnishing Materials

The Contractor shall be responsible for furnishing all materials necessary for testing.

1.08 Code Compliance Testing

Inspections and tests required by codes or ordinances or by a plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.09 Contractor's Convenience Testing

Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.10 Schedules for Testing

A. Establishing Schedule

1. The Contractor shall, by advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings, and make all arrangements for the testing laboratory to be on site to provide the required testing.
2. Provide all required time within the construction schedule.

- B. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the testing laboratory as required.

- C. When the testing laboratory is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be back charged to the Contractor and shall not be borne by the Owner.

1.11 Taking Specimens

Unless otherwise provided in the Contract Documents, all specimens and samples for tests will be taken by the testing laboratory or the Engineer.

1.12 Transporting Samples

The Contractor shall be responsible for transporting all samples, except those taken by testing laboratory personnel, to the testing laboratory.

END OF SECTION

Part 1 General**1.01 Scope**

- A. Temporary facilities required for this work include, but are not necessarily limited to:
 - 1. Temporary utilities such as water and electricity.
 - 2. First aid facilities.
 - 3. Sanitary facilities.
 - 4. Potable water.
 - 5. Temporary enclosures and construction facilities.
 - 6. Temporary heat.
- B. Temporary utilities for field offices shall be as specified in Section 01590 of these Specifications.

1.02 General

- A. First aid facilities, sanitary facilities and potable water shall be available on the Project site on the first day that any activities are conducted on site. The other facilities shall be provided as the schedule of the Project warrants.
- B. Maintenance: Use all means necessary to maintain temporary facilities in proper and safe condition throughout progress of the Work. In the event of loss or damage, immediately make all repairs and replacements necessary, at no additional cost to the Owner.
- C. Removal: Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

1.03 Temporary Utilities

- A. General
 - 1. Provide and pay all costs for all water, electricity and other utilities required for the performance of the Work.
 - 2. Pay all costs for temporary utilities until Project completion.
 - 3. Costs for temporary utilities shall include all power, water and the like necessary for testing equipment as required by the Contract Documents.
- B. Temporary Water: Provide all necessary temporary piping, and upon completion of the Work, remove all such temporary piping. Provide and remove water meters.
- C. Temporary Electricity
 - 1. Provide all necessary wiring for the Contractor's use.

2. Furnish, locate and install area distribution boxes such that the individual trades may use, their own construction type extension cords to obtain adequate power, and artificial lighting at all points where required by inspectors and for safety.

1.04 First Aid Facilities

The Contractor shall provide a suitable first aid station, equipped with all facilities and medical supplies necessary to administer emergency first aid treatment. The Contractor shall have standing arrangements for the removal and hospital treatment of any injured person. All first aid facilities and emergency ambulance service shall be made available by the Contractor to the Owner and the Engineer's personnel.

1.05 Sanitary Facilities

Prior to starting the Work, the Contractor shall furnish, for use of Contractor's personnel on the job, all necessary toilet facilities which shall be secluded from public observation. These facilities shall be either chemical toilets or shall be connected to the Owner's sanitary sewer system. All facilities, regardless of type, shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the area in which the Work is performed. Adequacy of these facilities will be subject to the Engineer's review and maintenance of same must be satisfactory to the Engineer at all times.

1.06 Potable Water

The Contractor shall be responsible for furnishing a supply of potable drinking water for employees, subcontractors, inspectors, engineers and the Owner who are associated with the Work.

1.07 Enclosures and Construction Facilities

Furnish, install and maintain for the duration of construction, all required scaffolds, tarpaulins, canopies, steps, bridges, platforms and other temporary construction necessary for proper completion of the Work in compliance with all pertinent safety and other regulations.

1.08 Parking Facilities

Parking facilities for the Contractor's and Contractor's subcontractors' personnel shall be the Contractor's responsibility. The storage and work facilities provided by the Owner will not be used for parking by the Contractor's or subcontractor's personnel.

1.09 Temporary Heating

A. General

1. All heating required during the progress of the Work, prior to the installation of the permanent heating system, shall be classified "temporary heat".
2. Prior to the installation of permanent heating equipment, furnish approved heaters and fuel as required.

3. Keep equipment and surroundings in clean, safe condition.
4. When the permanent heating equipment has been installed, it shall be put into operation to assure evenly distributed heat to all portions of buildings.
5. Pay all fuel bills for temporary heat.

B. Temperatures

1. Except as otherwise called for, a minimum temperature of 50 degrees F and a maximum temperature of 75 degrees F in the building shall be maintained during the working hours and above freezing at all other times.
2. See requirements of various other sections of these Specifications for minimum temperature to be maintained for the application of work under the various trades.

- C. Millwork: Supply adequate heating and ventilation to dry out buildings before installation of finished millwork and trim is started.

END OF SECTION

Part 1 General**1.01 Barricades, Lights and Signals**

- A. The Contractor shall furnish and erect such barricades, fences, lights and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the Work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any Work under construction.
- B. The Contractor will be held responsible for all damage to the Work due to failure of barricades, signs and lights and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at Contractor's cost and expense. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until the Project has been accepted by the Owner.

END OF SECTION

Part 1 General**1.01 Scope**

Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control, subject to the approval of the Owner. As a minimum, this may require the use of a water wagon twice a day to suppress dusty conditions.

1.02 Protection of Adjacent Property

- A. The Bidders shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the Work site that may be damaged by their operations. The Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from Contractor's operations.
- B. Protect all existing facilities (indoors or out) from damage by dust, fumes, spray or spills (indoors or out). Protect motors, bearings, electrical gear, instrumentation and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The Contractor shall be responsible for conducting all Work in a safe manner and shall take reasonable precautions to ensure the safety and protection of workers, property and the general public. The Contractor's responsibility for protection is described in Article 21 of the General Conditions.
- B. All construction shall be conducted in accordance with the latest applicable requirements for Part 1926 of the Occupational Safety and Health Act, Safety and Health Regulations for Construction, Section 107 of the Contract Work Hours and Safety Standards Act, as well as any other local, state or federal safety codes and regulations.
- C. The Contractor shall designate a trained and qualified employee who is to be responsible for ensuring that the Work is performed safely and in conformance with all applicable regulations.
- D. The Contractor shall determine the safety hazards involved in prosecuting the Work and the precautions necessary to conduct the Work safely. If the Contractor is unsure as to any special hazards which may be unique to the various processes and facilities involved in wastewater conveyance and treatment, it shall be Contractor's responsibility to determine such information prior to beginning the Work.
- E. The Contractor shall bear all risks associated with performing the Work and shall fully indemnify and hold harmless the Owner and Engineer.

1.02 Special Requirements

- A. The Contractor's attention is directed to the fact that construction activities involving existing wastewater facilities and sewer systems will occasionally involve work in potentially hazardous environments in which oxygen deficient, toxic or explosive conditions may exist. Additional hazards arise from the presence of pathogens in the wastewater and sludge and from the slime and scum layer that coat walking, working and other surfaces. In dealing with these hazards, the Contractor shall take special precautions to ensure worker safety. Such precautions shall include, but are not limited to, the following, as applicable:
 - 1. Installing temporary forced air ventilation equipment and ducts for fresh air in enclosed areas.
 - 2. Using pneumatic tools and equipment instead of electric driven equipment in hazardous areas.
 - 3. Avoiding the use of cutting torches, field welding and grinders in hazardous areas.
 - 4. Cleaning and disinfecting working surfaces with hot water, high pressure washers prior to commencing work.
 - 5. Installing sealed wooden baffles or bulkheads to isolate working areas from hazardous atmospheres.

6. Providing portable oxygen meters, combustible gas detectors and hydrogen sulfide detectors to continuously monitor the atmosphere in enclosed working areas.
 7. Providing safety harnesses, safety lines and recovery crews for workers in hazardous areas.
 8. Providing self contained breathing apparatus with spare air cylinders for workers in hazardous areas.
 9. Providing dry chemical fire extinguishers and connected fire hoses in areas where a danger of fire or explosion exists.
 10. Providing adequate, oxygen equipped, first aid facilities.
 11. Providing suitable wash up areas and facilities for workers.
 12. Installing temporary lighting using explosion proof fixtures in hazardous environments.
 13. Installing approved warning and hazard signs and posting safety procedures.
 14. Instructing all workers as to the hazards present, the procedures to be followed and the proper function and use of all safety and emergency equipment furnished.
- B. Prior to commencing Work on existing facilities and equipment, the Contractor shall notify the system/facility superintendent and shall ensure that the source of electrical energy to all affected equipment is shut off and locked out at the appropriate motor control center. Local switches and pushbutton stations, where provided, shall be locked in the "off" position.
- C. Prior to entering or commencing work in a hazardous area, the Contractor shall ensure that all safety and emergency equipment is in place and in satisfactory operating condition.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work under this Section shall include the furnishing of a minimum of one painted sign of not less than 32 square feet in area, with painted graphic content that includes:
1. Project title
 2. Owner's name
 3. Names of governmental units participating in the Project
 4. Engineer's name
 5. Names and titles of other parties to be directed by the Engineer

1.02 Design

The Contractor shall provide a scale drawing showing the graphic design, style of lettering and colors to the Engineer for approval.

Part 2 Products**2.01 Materials**

- A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior soft wood plywood with medium density overlay, standard large sizes to minimize joints.
- C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- D. Rough Hardware: Galvanized.
- E. Paint: Exterior quality, as specified in Section 09900 of these Specifications.

Part 3 Execution**3.01 Erection**

Erect the sign on the site in a high visibility location, adjacent to the Project as approved by the Engineer.

3.02 Maintenance

Contractor shall maintain the Project Sign in good condition during the Contract period.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work under this Section shall include providing a field office for the Contractor's use and for Project Meetings. The site for the field office shall be located on or conveniently near the Project site.
- B. Furnish, install and maintain storage and work sheds needed for construction.

1.02 Requirements

- A. General
 - 1. The materials, equipment, and furnishings provided under this Section may be new or used, but must be serviceable, adequate for the required purpose, and must not violate applicable codes or regulations.
 - 2. The Contractor shall make all provisions, and pay all costs for installation, utilities, rent, permit fees, and sitework for field offices and facilities.
- B. Construction
 - 1. Structurally sound, weathertight with floors raised above ground.
 - 2. Temperature transmission resistance shall be compatible with occupancy and storage requirements.
 - 3. Portable or mobile buildings may be used. Mobile trailers, when used, shall be modified for office use. Mobile trailers may not be used for living quarters.
- C. Contractor's Field Office and Facilities
 - 1. Size: As required for general use and to provide space for Project Meetings.
 - 2. Minimum Services
 - a. Lighting: 50 foot-candles at desk top height.
 - b. Exterior lighting at entrance door.
 - c. Automatic heating and cooling equipment sufficient to maintain comfort conditions of 78 degrees F inside in winter with outside air temperature of 20 degrees F and 72 degrees F inside in summer with outside air temperature of 100 degrees F.
 - d. Minimum of four 110 volt duplex electric convenience outlets, at least one on each wall.
 - e. Convenient access to drinking water (water cooler) and toilet facilities with sink.

3. Telephone: As required for Contractor's operations.
4. Racks and files for Project Record Documents.
5. Minimum Furnishings
 - a. One plan table (39 x 72 inches x 36 inches high)
 - b. Four chairs
 - c. One wastebasket
6. One 10 inch outdoor type thermometer.
7. Two rain gauges with one for the Project Inspector's use.

1.03 Parking Facilities

- A. Parking facilities for the Contractor's field office shall be the Contractor's responsibility. Storage and work facilities provided by the Owner will not be used.
- B. The Contractor shall provide a minimum of three additional parking spaces, either graveled or paved, for use by the Engineer and Owner.

1.04 Use of Permanent Facilities

Permanent facilities shall not be used for field offices or for storage.

Part 2 Products (Not Used)**Part 3 Execution****3.01 Preparation**

Fill and grade sites for temporary structures to provide surface drainage.

3.02 Installation

- A. Construct temporary field offices and storage facilities on proper foundations and provide connections for utility services.
 1. Secure portable or mobile buildings when used.
 2. Provide steps and landings at entrance doors.
 3. Provide tie downs for 100 mile per hour gusts and winds.
- B. Mount thermometer at convenient outside location, not in direct sunlight.
- C. Mount rain gauges in accessible open area
- D. Locate construction office facilities at locations within the Project area approved by the Engineer and Owner.

3.03 Maintenance and Cleaning

Provide periodic maintenance and cleaning for temporary structures, furnishings, equipment and services.

3.04 Removal

- A. Remove temporary field offices, contents and services at a time when no longer needed. Offices and contents shall be the property of the Contractor.
- B. Remove foundations and debris; grade site to required elevations and clean areas.

END OF SECTION

Part 1 General**1.01 Scope**

This Section outlines the restrictions and requirements for substitutions, product and manufacturer options, and construction method options.

1.02 Definitions

- A. For the purposes of these Contract Documents, a "substitute item" shall be defined as one of the following:
 - 1. A product or manufacturer offered as a replacement to a specified product or manufacturer.
 - 2. A product or manufacturer offered in addition to a specified product or manufacturer.
- B. For the purposes of these Contract Documents, a "substitute construction method" shall be defined as one of the following:
 - 1. A mean, method, technique, sequence or procedure of construction offered as a replacement for a specified mean, method, technique, sequence or procedure of construction.
 - 2. A mean, method, technique, sequence or procedure of construction offered in addition to a specified mean, method, technique, sequence or procedure of construction.

1.03 General

- A. An item or construction method, which is offered where no specific product, manufacturer, mean, method, technique, sequence or procedure of construction is specified or shown on the Drawings, shall not be considered a substitute and shall be at the option of the Contractor, subject to the provisions in the Contract Documents for that item or construction method.
- B. For products specified only by a referenced standard, the Contractor may select any product by any manufacturer, which meets the requirements of the Specifications, unless indicated otherwise in the Contract Documents.
- C. If the manufacturer is named on the Drawings or in the Specifications as an acceptable manufacturer, products of that manufacturer meeting all requirements of the Specifications and Drawings are acceptable.
- D. Whenever the Engineer's design is based on a specific product of a particular manufacturer, that manufacturer will be shown on the Drawings and/or listed first in the list of approved manufacturers in the Specifications. Any Bidder intending to furnish products of other than the first listed manufacturer, or furnish substitute items, shall:
 - 1. Verify that the item being furnished will fit in the space allowed, perform the same functions and have the same capabilities as the item specified.
 - 2. Include in its Bid the cost of all accessory items which may be required by the other listed substitute product,

3. Include the cost of any architectural, structural, mechanical, piping, electrical or other modifications required, and
 4. Include the cost of required additional work by the Engineer, if any, to accommodate the item.
- E. Whenever a product is identified on the Drawings or in the Specifications by reference to manufacturers or vendors names, trade names, catalog numbers, etc., it is intended only to denote the quality standard of product desired and that they do not restrict Bidders to a specific brand, make, manufacturer or specific name. These listings and citations are used only to set forth and convey to Bidders the general style, type, character and quality of product desired. Equivalent products will be acceptable, subject to the substitution provisions of this Section.
- F. Whenever a product specification includes minimum experience requirements which the manufacturer selected by the Contractor cannot meet, the manufacturer shall furnish the Owner with a cash deposit, or bond acceptable to the Owner in an amount equal to the cost of the product, which shall remain in effect until the experience requirement has been met.

1.04 Approvals

Approval, of a substitution as an acceptable manufacturer, of the Engineer is dependent on determination that the product offered is essentially equal in function, performance, quality of manufacture, ease of maintenance, reliability, service life and other criteria to that on which the design is based; and will require no major modifications to structures, electrical systems, control systems or piping systems.

1.05 Substitutions and Options

- A. No substitutions will be considered for the manufacturers listed in the Bid Form.
- B. After Notice to Proceed
1. Substitute items will be considered only if the term "equal to" precedes the names of acceptable manufacturers in the Specification.
 2. Where items are specified by referenced standard or specified as indicated in Article 1.03, Paragraph A. above, such items shall be submitted to the Engineer for review.
 3. The Contractor shall submit shop drawings on the substitute item for the Engineer's review in accordance with the Section 01340.
- C. Prior to Opening of Bids
1. No consideration or approvals will be made for products specified by a referenced standard, or specified as indicated in Article 1.02, Paragraph A. above. Such consideration may occur only after the Notice to Proceed.
 2. No consideration or approvals will be made for products being offered where the term "equal to" precedes the name of an approved product.

Such substitution consideration may occur only after the Notice to Proceed.

3. If the term "or equal" follows the names of acceptable manufacturers, then other manufacturers desiring approval as an acceptable manufacturer may submit the product information to the Engineer for approval during the bidding phase, as indicated below. With the exception of where the phrase "no substitutions" is associated with a list of manufacturers, where a list of acceptable manufacturers is not preceded by the phrase "equal to", the list of acceptable manufacturers shall be considered as having the phrase "or equal" following the list, and the list being subject to the "or equal" provisions of this section.
4. The manufacturer shall include the following items in its "or equal" submittal:
 - a. Descriptive literature including information on materials used, minimum design standards, standard design features, manufacturing processes and facilities, and similar information which will indicate experience and expertise in the manufacture of the product being evaluated.
 - b. Performance specifications applicable to the manufacturer's standard design which indicates the level of performance to be expected from the product.
 - c. A complete set of submittal drawings of similar products which have been completed and placed into operation.
 - d. A list of existing installations of products similar in type and size, information required to satisfy specified experience requirements, or a copy of the bond to be submitted in lieu of experience.
 - e. Evidence of technical ability of the manufacturer to design and manufacture products meeting Project requirements.
 - f. Evidence submitted shall include, as a minimum, descriptions of engineering and manufacturing staff capabilities.
 - g. A copy of the manufacturer's most recent annual business report. Include a statement comparing the present net worth of the manufacturer in comparison to the total value of all products proposed to be furnished. Net worth must exceed the total value of all products proposed.
 - h. A complete description of field service capabilities, including the location of field service facilities which would serve the proposed facility and the number and qualifications of personnel working from that location.
 - i. A complete list of all requirements of the Drawings and Specifications with which the manufacturer cannot conform, including reasons why alternate features are considered equivalent.

- j. If descriptive literature or drawings illustrate standard products with design features or materials not in compliance with Project requirements then these exceptions must be specifically listed. Failure to do so will indicate intent by the manufacturer to modify design features and alter materials to meet Project requirements.
 - k. Where additional information is submitted to supplement the submittal, all changes to the list of exceptions shall be specifically noted.
 - l. All other information necessary to fully evaluate the product for consideration.
5. This "or equal" submittal shall reach the Engineer no later than 14 days prior to the Bid date. Submittals which do not include a complete list of exceptions to Project requirements, or the statement "No exceptions to the Specifications will be taken", will automatically be rejected by the Engineer. Manufacturers will be advised of approval or rejection in writing no later than 10 days prior to the Bid date. Rejected submittals may be supplemented with additional information and resubmitted no later than five days prior to the Bid date. Manufacturers making supplementary submittals will be advised of approval or rejection in writing no later than one day prior to the Bid date.
6. Bids based on products which have not received the approval of the Engineer may be determined non-responsive by the Owner and rejected.

END OF SECTION

Part 1 General**1.01 Scope**

This Section covers the general cleaning which the Contractor shall be required to perform both during construction and before final acceptance of the Project unless otherwise shown on the Drawings or specified elsewhere in these Specifications.

1.02 Quality Assurance

- A. Daily, and more often if necessary, conduct inspections verifying that requirements of cleanliness are being met.
- B. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

1.03 Hazardous Material and Waste

- A. The Contractor shall handle hazardous waste and materials in accordance with applicable local, state, and federal regulations. Waste shall also be disposed of in approved landfills as applicable.
- B. The Contractor shall prevent accumulation of wastes which create hazardous conditions.
- C. Burning or burying rubbish and waste materials on the site shall not be allowed.
- D. Disposal of hazardous wastes or materials into sanitary or storm sewers shall not be allowed.

1.04 Disposal of Surplus Materials

Unless otherwise shown on the Drawings, specified or directed, the Contractor shall legally dispose off the site all surplus materials and equipment from demolition and shall provide suitable off site disposal site, or utilize a site designated by the Owner.

Part 2 Products**2.01 Cleaning Materials and Equipment**

Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

2.02 Compatibility

Use only the cleaning materials, methods and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Engineer.

Part 3 Execution**3.01 Progress Cleaning****A. General**

1. Do not allow the accumulation of scrap, debris, waste material and other items not required for construction of this Work.
2. At least each week, and more often if necessary, completely remove all scrap, debris and waste material from the job site.
3. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Restack materials stored on site weekly.
3. At all times maintain the site in a neat and orderly condition which meets the approval of the Engineer.

C. Structures (When applicable)

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by using a hand held broom.
3. As required preparatory to installation of successive materials, clean the structures or pertinent portions as recommended by the manufacturer of the successive material.
4. Following the installation of finish floor materials, clean the finish floor daily. "Clean", for the purpose of this paragraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Engineer, may be injurious to the finish floor material.
5. Schedule cleaning operation so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted surfaces.

3.02 Final Cleaning

- A. Definitions: Unless otherwise specifically specified, "clean" for the purpose of this Article shall be interpreted as the level of cleanliness generally provided by

commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

- B. General: Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris and waste. Conduct final progress cleaning as described in 3.01 above.
- C. Site: Unless otherwise specifically directed by the Engineer, hose down all paved areas on the site and all public sidewalks directly adjacent to the site; rake clean other surfaces of the grounds. Completely remove all resultant debris.
- D. Structures (When applicable)
 - 1. Remove all traces of soil, waste material, splashed material, and other foreign matter to provide a uniform degree of exterior cleanliness. Visually inspect all exterior surfaces and remove all traces of soil, waste material, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.
 - 2. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all paint droppings, spots, stains and dirt from finished surfaces.
 - 3. Clean all glass inside and outside.
 - 4. Polish all surfaces requiring the routine application of buffed polish. Provide and apply polish as recommended by the manufacturer of the material being polished.
- E. Post Construction Cleanup: All evidence of temporary construction facilities, haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other evidence of construction, as directed by the Engineer.
- F. Restoration of Landscape Damage: Any landscape feature damaged by the Contractor shall be restored as nearly as possible to its original condition at the Contractor's expense. The Engineer will decide what method of restoration shall be used.
- G. Timing: Schedule final cleaning as approved by the Engineer to enable the Owner to accept the Project.

3.03 Cleaning During Owner's Occupancy

Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Engineer in accordance with the Supplementary Conditions of the Contract Documents.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work under this Section includes, but is not necessarily limited to, the compiling, maintaining, recording and submitting of project record as-built documents as herein specified.
- B. Record documents include, but are not limited to:
 - 1. Drawings;
 - 2. Specifications;
 - 3. Change orders and other modifications to the Contract;
 - 4. Engineer field orders or written instructions, including Requests for Information (RFI) and Clarification Memorandums;
 - 5. Reviewed shop drawings, product data and samples;
 - 6. Test records.
- C. The Contractor shall maintain on the Project site throughout the Contract Time an up to date set of Record Drawings.

1.02 Maintenance of Documents and Samples

- A. Storage
 - 1. Store documents and samples in the Contractor's field office, apart from documents used for construction.
 - 2. Provide files and racks for storage of documents.
 - 3. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with format of these Specifications.
- C. Maintenance
 - 1. Maintain documents in a clean, dry, legible condition and in good order.
 - 2. Do not use record documents for construction purposes.
 - 3. Maintain at the site for the Owner one copy of all record documents.
- D. Make documents and samples available at all times for inspection by Engineer.
- E. Failure to maintain the Record Documents in a satisfactory manner may be cause for withholding of a certificate for payment.

1.03 Quality Assurance

- A. Unless noted otherwise, Record Drawings shall provide dimensions, distances and coordinates to the nearest 0.1 foot.

- B. Unless noted otherwise, Record Drawings shall provide elevations to the nearest 0.01 foot for all pertinent items constructed by the Contractor.

1.04 Recording

- A. Label each document "Project Record" in neat, large printed letters.
- B. Recording
 - 1. Record information concurrently with construction progress.
 - 2. Do not conceal any work until required information is recorded.

1.05 Record Drawings

- A. The Contractor shall provide one set of the Contract drawings, with all changes recorded in that one set.
- B. Legibly mark drawings to record actual construction, including:
 - 1. All Construction
 - a. Changes of dimension and detail.
 - b. Changes made by Requests for Information (RFI), field order, clarification memorandums or by change order.
 - c. Details not on original Drawings.
 - 2. Site Improvements, Including Underground Utilities
 - a. Horizontal and vertical locations of all exposed and underground utilities and appurtenances, both new facilities constructed and those utilities encountered, referenced to permanent surface improvements.
 - b. Location of and dimensions of roadways and parking areas, providing dimensions to back of curb when present.
 - c. The locations shall be referenced to at least two easily identifiable, permanent landmarks (e.g., power poles, valve markers, etc.) or benchmarks.
 - d. The Record Drawings shall include the horizontal angle and distance between manhole covers.
 - 3. Structures (When applicable)
 - a. Depths of various elements of foundation in relation to finish first floor datum or top of wall.
 - b. Location of internal and buried utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

1.06 Specifications

- A. Legibly mark each section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Requests for Information (RFI), field order, clarification memorandums, or by change order.

1.07 Submittal

- A. At contract closeout, deliver Record Documents to the Engineer for the Owner.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date
 - 2. Project title and number
 - 3. Contractor's name and address
 - 4. Title and number of each record document
 - 5. Signature of Contractor or Contractor's authorized representative

END OF SECTION

Part 1 General**1.01 Project Maintenance and Warranty**

- A. Maintain and keep in good repair the Work covered by these Drawings and Specifications until acceptance by the Owner.
- B. The Contractor shall warrant for a period of one year from the date of Owner's written acceptance of certain segments of the Work and/or Owner's written final acceptance of the Project, as defined in the Contract Documents, that the completed Work is free from all defects due to faulty products or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect throughout the warranty period.
- C. The Contractor shall not be obligated to make replacements which become necessary because of ordinary wear and tear, or as a result of improper operation or maintenance, or as a result of improper work or damage by another Contractor or the Owner, or to perform any work which is normally performed by a maintenance crew during operation.
- D. In the event of multiple failures of major consequences prior to the expiration of the one year warranty described above, the affected unit shall be disassembled, inspected and modified or replaced as necessary to prevent further occurrences. All related components which may have been damaged or rendered non serviceable as a consequence of the failure shall be replaced. A new 12 month warranty against defective or deficient design, workmanship, and materials shall commence on the day that the item is reassembled and placed back into operation. As used herein, multiple failure shall be interpreted to mean two or more successive failures of the same kind in the same item or failures of the same kind in two or more items. Major failures may include, but are not limited to, cracked or broken housings, piping, or vessels, excessive deflections, bent or broken shafts, broken or chipped gear teeth, premature bearing failure, excessive wear or excessive leakage around seals. Failures which are directly and clearly traceable to operator abuse, such as operations in conflict with published operating procedures or improper maintenance, such as substitution of unauthorized replacement parts, use of incorrect lubricants or chemicals, flagrant over or under lubrication and using maintenance procedures not conforming with published maintenance instructions, shall be exempted from the scope of the one year warranty. Should multiple failures occur in a given item, all products of the same size and type shall be disassembled, inspected, modified or replaced as necessary and rewarranted for one year.
- E. The Contractor shall, at Contractor's own expense, furnish all labor, materials, tools and equipment required and shall make such repairs and removals and shall perform such work or reconstruction as may be made necessary by any structural or functional defect or failure resulting from neglect, faulty workmanship or faulty materials, in any part of the Work performed by the Contractor. Such repair shall also include refilling of trenches, excavations or embankments which show settlement or erosion after backfilling or placement.

- F. Except as noted on the Drawings or as specified, all structures such as embankments and fences shall be returned to their original condition prior to the completion of the Contract. Any and all damage to any facility not designated for removal, resulting from the Contractor's operations, shall be promptly repaired by the Contractor at no cost to the Owner.
- G. The Contractor shall be responsible for all road and entrance reconstruction and repairs and maintenance of same for a period of one year from the date of final acceptance. In the event the repairs and maintenance are not made immediately and it becomes necessary for the owner of the road to make such repairs, the Contractor shall reimburse the owner of the road for the cost of such repairs.
- H. In the event the Contractor fails to proceed to remedy the defects upon notification within 15 days of the date of such notice, the Owner reserves the right to cause the required materials to be procured and the work to be done, as described in the Drawings and Specifications, and to hold the Contractor and the sureties on Contractor's bond liable for the cost and expense thereof.
- I. Notice to Contractor for repairs and reconstruction will be made in the form of a registered letter addressed to the Contractor at Contractor's home office.
- J. Neither the foregoing paragraphs nor any provision in the Contract Documents, nor any special guarantee time limit implies any limitation of the Contractor's liability within the law of the place of construction.

END OF SECTION

Part 1 General**1.01 Scope**

- A. Clearing and grubbing includes, but is not limited to, removing from the Project site, trees, stumps, roots, brush, structures, abandoned utilities, trash, debris and all other materials found on or near the surface of the ground in the construction area and understood by generally accepted engineering practice not to be suitable for construction of the type contemplated. Precautionary measures that prevent damage to existing features to remain is part of the Work.
- B. Clearing and grubbing operations shall be coordinated with temporary and permanent erosion and sedimentation control procedures.
- C. Within the limits shown on the drawings, the site will be cleared and grubbed to prepare for construction.

1.02 Quality Assurance

- A. The Contractor shall comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction over the Project. All required permits of a temporary nature shall be obtained for construction operations by the Contractor.
- B. Open burning will not be allowed.

1.03 Job Conditions

- A. Location of the Work: The area to be cleared and grubbed is shown schematically on the Drawings or specified below. It includes all areas designated for construction.

Part 2 Products**2.01 Equipment**

- A. The Contractor shall furnish equipment of the type normally used in clearing and grubbing operations including, but not limited to, tractors, trucks, loaders and root rakes.

Part 3 Execution**3.01 Scheduling of Clearing**

- A. The Contractor shall clear at each construction site only that length of the right of way, permanent or construction easement which would be the equivalent of one month's work or 1000 feet of pipe laying.
- B. The Engineer may permit clearing for additional lengths of the pipe line provided that temporary erosion and sedimentation controls are in place and a satisfactory stand of temporary grass is established. Should a satisfactory stand of grass not be possible, no additional clearing shall be permitted beyond that specified above.

- C. A satisfactory stand of grass shall have no bare spots larger than one square yard. Bare spots shall be scattered and the bare area shall not comprise more than one percent of any given area.

3.02 Clearing and Grubbing

- A. Maintain bench marks, monuments and other reference points. Re-establish at no cost to the owner, any such reference points if disturbed or destroyed.
- B. Clear and grub the permanent easement or 10 feet, whichever is greater on each side of the pipeline before excavating. Remove all trees, growth, debris, stumps and other objectionable matter. Clear the construction easement or road right of way only if necessary and upon approval by the inspector.
- C. Materials to be cleared, grubbed and removed from the Project site include, but are not limited to, all trees, stumps, roots, brush, trash, organic matter, paving, miscellaneous structures, houses, debris and abandoned utilities.
- D. Grubbing shall consist of completely removing roots, stumps, trash and other debris from all graded areas so that topsoil is free of roots and debris. Topsoil is to be left sufficiently clean so that further picking and raking will not be required.
- E. All stumps, roots, foundations and planking embedded in the ground shall be removed and disposed of. Piling and butts of utility poles shall be removed to a minimum depth of two feet below the limits of excavation for structures, trenches and roadways or two feet below finish grade, whichever is lower.
- F. Landscaping features shall include, but are not necessarily limited to, fences, cultivated trees, cultivated shrubbery, property corners, man made improvements, subdivision and other signs within the right of way and easement. The Contractor shall take extreme care in moving landscape features and promptly re establishing these features. Fences shall be provided with a gate across the permanent easement. Existing structures shall be relocated such that they are off the easement.
- G. Surface rocks and boulders shall be grubbed from the soil and removed from the site if not suitable as rip rap.
- H. Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.
- I. Any work pertaining to utility poles shall comply with the requirements of the appropriate utility.
- J. All fences adjoining any excavation or embankment that, in the Contractor's opinion, may be damaged or buried, shall be carefully removed, stored and replaced. Any fencing that, in the Engineer's opinion, is significantly damaged shall be replaced with new fence material.
- K. The Contractor shall exercise special precautions for the protection and preservation of trees, cultivated shrubs, sod, fences, etc. situated within the limits of the construction area but not directly within excavation and/or fill limits. The Contractor shall be held liable for any damage the Contractor's operations have inflicted on such property. For tree protection and replacement see Section 02950.

- L. The Contractor shall be responsible for all damages to existing improvements resulting from Contractor's operations.

3.03 Disposal of Debris

- A. The debris resulting from the clearing and grubbing operation shall be hauled to a disposal site secured by the Contractor and shall be disposed of in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or in any street or alley. No debris shall be deposited upon any private property except with written consent of the property owner. In no case shall any material or debris be left on the Project, shoved onto abutting private properties or buried on the Project.
- B. When approved in writing by the Engineer and when authorized by the proper authorities, the Contractor may dispose of such debris by burning on the Project site provided all requirements set forth by the governing authorities are met. The authorization to burn shall not relieve the Contractor in any way from damages which may result from Contractor's operations. On easements through private property, the Contractor shall not burn on the site unless written permission is also secured from the property owner, in addition to authorization from the proper authorities.

(Remainder of this page intentionally left blank.)

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work specified in this Section consists of providing, maintaining and removing temporary erosion and sedimentation controls measures as shown on the drawings.
- B. Temporary erosion controls, include, but are not limited to, grassing, mulching, watering and reseeding on-site surfaces and spoil and borrow area surfaces, and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Georgia Erosion and Sedimentation Act of 1975, as amended, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.
- C. Permanent erosion controls, include but are not limited to, grassing, sodding planting trees and shrubberies, buffer zone creations, matting and blankets, stream bank stabilization, and are provide to sop or minimize the soil erosion on a permanent basis.
- D. Temporary sedimentation controls include, but are not limited to, silt dams, sediment traps, silt barriers, filter stone and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Federal Clean Water Act of 1987, as amended.
- E. Land disturbance activity shall not commence until the Building Permit or Land Disturbance Permit (LDP) has been issued, which authorizes land disturbance activities.
- F. Basic Principles
 - 1. Conduct the earthwork trench and excavation and backfilling activities in such a manner to fit the topography, soil type and condition.
 - 2. Minimize the disturbed area and the duration of exposure to erosion elements.
 - 3. Stabilize disturbed areas immediately. after the backfill is completed.
 - 4. Safely convey run-off from the site to an outlet such that erosion will not be increased off site.
 - 5. Retain sediment on site that was generated on site.
 - 6. Minimize encroachment upon watercourses.
- G. Temporary Erosion and Sedimentation Control: In general, temporary erosion and sedimentation control procedures shall be directed toward:
 - 1. Preventing soil erosion at the source.
 - 2. Preventing silt and sediment from entering any waterway if soil erosion cannot be prevented.

3. Preventing silt and sediment from migrating downstream in the event it cannot be prevented from entering the waterway.
- H. Permanent Erosion Control: Permanent erosion control measures shall be implemented to prevent sedimentation of the waterways and to prevent erosion of the Project site.

1.02 Submittals

- A. Submit product data in accordance with the requirements of Section 01340 of these specifications.
- B. At the Pre-Construction Conference, the Contractor shall submit, for the Engineer's approval, a schedule for the accomplishment of temporary and permanent erosion and sedimentation control work. No work shall be started until the erosion and sedimentation control schedule and methods of operation have been approved by the Engineer and/or local authority.

1.03 Quality Assurance

- A. General: Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated herein and these Specifications.
- B. Conflicts: Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.
- C. The temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques and sequence of operation will be installed by the Contractor at no additional cost to the Owner.

Part 2 Products

2.01 Sediment Barrier

- A. Silt Fence:
 1. A silt fence (Sd1) is a temporary sediment barrier made of woven, synthetic filtration fabric supported by a steel or wood posts.
 2. Silt fence should not be installed across streams, ditches, waterways, or other concentrated flow areas.
 3. All silt fences should be installed along the contours, ever up or down slope.
 4. The drainage area should not exceed $\frac{1}{4}$ acre for every 100 feet of silt fence.
 5. Where all sheet flow runoff is to be stored behind the fence, where no storm water disposal system is present, maximum slope length behind silt fence should not exceed those shown in following table:

Land Slope (percent)	Maximum Slope Length Above Fence (feet)
Less than 2	100
2 to 5	75
5 to 10	50
10 to 20	25
Greater than 20*	15
* In areas where true slope is greater than 20%, a flat area length of 10 feet between the toe of the slope and the fence should be provided.	

6. Type A silt fence (Sd1-A)

This 36-inch wide filter fabric should be used and the fabric should meet the requirements of ASTM D-4632, D-4751 and D-3786. It should have an AOS (apparent opening size or maximum sieve size) of No.30. Wood or steel posts can be used and shall be placed no more than 6 feet apart.

7. Type C silt fence (Sd1-c)

This is a 36-inch wide fence with wire reinforcement. This fence should be used where runoff flows or velocities are high or where slopes exceed a vertical height of 10 feet. Only steel posts shall be used and shall be spaced at 4 feet apart.

Along stream buffers and other sensitive areas, two rows of type c silt fence, 5 feet apart, shall be used. A single row of hay bales shall be installed between the two rows.

B Sediment Traps (Sd2)

1. Inlet sediment Traps (Sd2), formed around storm drain inlets, are designed to prevent sediment from entering storm drainage systems.
2. Traps can consist of a baffle box, block and gravel, or more commonly filter fabric and a frame.
3. "Pigs-in-a-blanket" are typically gravel bags wrapped with wire, blocks wrapped in filter fabric, or waddles.

C. Hay bales shall be clean, seedfree cereal hay type., rectangular in shape and shall contain five cubic feet or more of material.

D. Netting shall be 1/2-inch, galvanized steel, chicken wire mesh.

E. Filter stone shall be crushed stone conforming to Georgia Department of Transportation Table 800.01H, Size Number 3.

F. Concrete block shall be hollow, non-load-bearing type.

- G. Plywood shall be 3/4-inch thick exterior type.
- H. Blanket and matting materials shall be in conformance with Georgia Department of Transportation Qualified Product List (QPL #62 for blankets, QPL #49 for matting).
- I. Dirtbag shall be a non-woven bag which is sewn with a double needle machine using a high strength thread. The dirtbag seam shall have an average wide width strength per ASTM D-4884.

2.02 Rip Rap

- A. Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or greater. Rip rap shall have less than 66 percent wear when tested in accordance with AASHTO T-96. Unless shown or specified otherwise, stone rip rap shall be Type 1 rip rap.
- B. Type 1 Rip Rap: The largest pieces shall have a maximum volume of two cubic feet. At least 35 percent of the mass shall be comprised of pieces that weigh 125 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Section 805.01 Stone Dumped Rip Rap, Type 1.
- C. Type 3 Rip Rap: The largest pieces shall have a maximum approximate volume of one cubic foot. At least 35 percent of the mass shall be comprised of pieces that weigh 15 pounds or more. The remainder shall be well graded down to the finest sizes. Rock fines shall comprise a maximum of 10 percent of the total mass. Rock fines are defined as material passing a No. 4 sieve. Rip rap size shall conform to Georgia Department of Transportation Section 805.01 Stone Dumped Rip Rap, Type 3.
- D. 200 Pound Rip Rap: Minimum weight of individual stones shall be 200 pounds.

2.03 Filter Fabric

- A. The filter fabric for use under rip rap shall be a monofilament, polypropylene woven fabric or a non-woven fabric meeting the specifications as established by Task Force 25 for the Federal Highway Administration. The filter fabric shall have an equivalent opening size (EOS) of 70.
- B. Filter fabric under rip rap shall be equal to Mirafi, Amoco or Exxon.

2.04 Concrete

- A. Concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Part 3 Execution

3.01 General

- A. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the Georgia Erosion and

Sedimentation Act of 1975, as amended, local enforcing agency guidelines, and these Specifications.

3.02 Temporary Erosion and Sedimentation Control

- A. Temporary erosion and sedimentation control procedures should be initially directed toward preventing silt and sediment from entering the creeks. The preferred method is to provide an undisturbed natural buffer, extending a minimal 25 feet from the top of the bank, to filter the run-off. Should this buffer prove infeasible due to construction activities being too close to the creek, or if the amount of sediment overwhelms the buffer, the Contractor shall place silt fences to filter the run-off and, if necessary, place permanent rip rap to stabilize the creek banks. When excavation activities disturb the previously stated preventative measures, or if they are not maintained, or whenever the construction activities cross the creeks, the check dams shall be installed downstream and within 200 feet of the affected area.
- B. Silt dams, silt fences, traps, barriers, check dams, appurtenances and other temporary measures and devices shall be installed as indicated on the approved plans and working drawings, or as directed by Construction Manager, shall be maintained until no longer needed, and shall then be removed. Deteriorated hay bales and dislodged filter stone shall be replaced with new materials. Detention ponds, if constructed, shall be maintained in a condition ensuring that unfiltered water will not leave the pond.
- C. Where permanent grassing is not appropriate, and where the Contractor's temporary erosion and sedimentation control practices are inadequate, the Construction Manager may direct the Contractor to provide temporary vegetative cover with fast growing seedings. Such temporary vegetative cover shall be provided by the Contractor in compliance with the Manual for Erosion and Sedimentation Control in Georgia, specifically in the selection of species, planting dates and application rates for seedings, fertilizer and mulching, with the exception that kudzu shall not be permitted. Temporary erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the Engineer, the Contractor's temporary erosion and sedimentation control measures are inadequate, the Contractor shall provide additional maintenance for existing measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.
- D. All erosion and sedimentation control devices including check dams, shall be inspected by the Contractor at least weekly and within 24 hours of each rainfall occurrence and cleaned out and repaired by the Contractor as necessary.
- E. Temporary erosion and sedimentation control devices shall be installed and maintained from the initial land disturbance activity until the satisfactory completion and establishment of permanent erosion control measures. At that time, temporary devices shall be removed.

3.03 Sediment Barriers

- 1. Sediment barriers shall include, but are not necessarily limited to, silt fences, hay bales, and inlet sediment traps which prevents sediment from exiting the disturbed area.
- 2. Silt fences, hay bales and stone check dams shall not be used in any flowing stream creek or river.

3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Engineer.
4. Sediment barriers shall be maintained to ensure the depth of empounded sediment is no more than one-half of the original height of the barrier or as directed by the Engineer. Torn, damaged, destroyed or washed-out barriers shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Engineer.
5. Sediment Barrier Removal
 - a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Engineer.
 - b. Accumulated sediment shall be removed from the barrier and removed from the site.
 - c. All non-biodegradable parts of the barrier shall be disposed of properly. The hay bales may be spread evenly across disturbed areas as a mulching material.
 - d. The disturbed area created by barrier removal shall be permanently stabilized.

3.04 Permanent Erosion Control

- A. Permanent erosion control shall include:
 1. Restoring the work site to its original contours, unless shown otherwise on the Drawings or directed by the Construction Manager.
 2. Permanent vegetative cover shall be performed in accordance with Article 3.04 05 of this Section.
 3. Permanent stabilization of steep slopes and creeks shall be performed in accordance with Article 3.05 of this Section.
- B. Permanent erosion control measures shall be implemented as soon as practical after the completion of pipe installation or land disturbance for each segment of the Project. In no event shall implementation be postponed when no further construction activities will impact that portion or segment of the Project. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

3.05 Grassing

- A. General
 1. All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.
 2. When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and

- mulched in an effort to restore to a protected condition. Critical areas shall be sodded as approved or directed by the Construction Manager.
3. Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.
 4. Permanent grassing shall be of a perennial species.
- B. Replant grass removed or damaged in residential areas using the same variety of grass and at the first appropriate season. Where sod is removed or damaged, replant such areas using sod of the same species of grass at the first appropriate season. Outside of residential or landscaped areas, grass the entire area disturbed by the work on completion of work in any area. In all areas, promptly establish successful stands of grass.
- C. Grassing activities shall comply with the Manual for Erosion and Sediment Control in Georgia, specifically for the selection of species, with the exception that kudzu shall not be permitted, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances) the Contractor shall provide temporary vegetative cover. The Contractor must return to the site (at the appropriate season) to install permanent vegetation in areas that have received temporary vegetative cover.

3.06**Rip Rap**

- A. Unless shown otherwise on the Drawings, rip rap shall be placed where ordered by the Construction Manager, at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where natural vegetation is removed from banks of the streams or drainage ditches. Carefully compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction along side a stream or drainage ditch as well as crossing a stream or drainage ditch.
- B. When trenching across a creek, place rip rap a distance of 10 to 20 feet upstream and 10 to 20 feet downstream from the top of the trench excavation. Place rip rap across creek bottom, across creek banks and extend rip rap placement five to ten feet beyond the top of each creek bank.
- C. Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly within the construction easement.
- D. Placement of Filter Fabric: The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip overlaps the

downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three feet during construction. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the County.

E. Placement of Rip Rap

1. Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural slope of the stream bank and stream bottom.
2. Stone rip rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be -6-inches and +12-inches. If the Drawings or the Bid do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.

3.07 Clean Up

- A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the Engineer.
- B. Final clean-up shall be performed in accordance with the requirements of Section 01710 of these specifications.

(Remainder of this page intentionally left blank.)

END OF SECTION

PART 1 General**1.01 Scope**

- A. The section shall apply to all temporary road construction, including stream crossings and access roads.
- B. Temporary road construction includes, but is not limited to, providing all construction exits, rip-rap, traffic control, and excavation work necessary to create vehicular access throughout the entire length of the project.

1.02 Definitions

- A. A "construction exit" is defined as a stone-stabilized pad located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk, or parking area.
- B. A "stream crossing" is defined as a temporary structure installed across a flowing stream or watercourse for use by construction equipment.

1.03 Job Conditions

- A. Location of the Work: The area to be constructed as shown schematically on the Drawings or specified below.

1.04 Related Sections

- A. Section 02125: Erosion and Sediment Control
- B. Section 0212002110: Site Prep Clearing and Grubbing

Part 2 Products**2.01 Equipment**

- A. The Contractor shall furnish equipment of the type normally used in temporary road construction operations, including, but not limited to, tractors, trucks, loaders, graders, bulldozers, and cranes.

Part 3 Execution**3.01 Construction Exit**

- A. Provide temporary stone exit/entrance pad located at points of vehicular ingress and egress to the site and maintain in service until instructed otherwise by the Construction Manager. Minimum pad thickness shall be 6 inches; minimum length shall be 50 feet. Maintain in a condition that will prevent tracking or flow of mud onto public road. Construction Exits shall conform with the requirements set forth in the Manual for Erosion and Sediment Control in Georgia Fifth Edition (2000), Georgia Soil and Water Conservation Commission. Excerpts from the manual are included in this Specification.

3.02 Stream Crossings

- A. Provide temporary stream crossings located at points of vehicular crossings and maintain in service until instructed otherwise by the Construction Manager.

Structures shall be protected from washout during periods of peak discharges by diverting water around the structures. Structures shall be designed to withstand flows from a 10-year, 24 hour frequency storm or the storm specified in Title 12-7-1 of the Official Code of the Georgia Annotated. *Contractor shall obtain the services of a licensed Georgia Professional Engineer (P.E.) to size these structures and certify that the design has met the above referenced criteria.* Excerpts from the Manual for Erosion and Sediment Control in Georgia Fifth Edition (2000) are included in this specification for reference.

(Remainder of this page intentionally left blank.)

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work under this Section consists of furnishing all labor, equipment and materials and performing all operations in connection with the trench excavation and backfill required to install the pipelines shown on the Drawings and as specified.
- B. Excavation shall include the removal of any trees, stumps, brush, debris or other obstacles which remain after the clearing and grubbing operations, which may obstruct the work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the pipe and appurtenances in conformance with the lines and grades shown on the Drawings and as specified.
- C. Backfill shall include the refilling and compaction of the fill in the trenches and excavations up to the surrounding ground surface or road grade at crossing as shown on the drawings.
- D. The trench is divided into five specific areas:
 - 1. Foundation: The area beneath the bedding, sometimes also referenced to as trench stabilization.
 - 2. Bedding: The area above the trench bottom (or foundation) and below the bottom of the barrel of the pipe.
 - 3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.
 - 4. Initial Backfill: The area above the haunching material and below a plane 1212-inches above the top of the barrel of the pipe.
 - 5. Final Backfill: The area above a plane 1212-inches above the top of the barrel of the pipe.
- E. The choice of method, means, techniques and equipment rests with the Contractor. The Contractor shall select the method and equipment for trench excavation and backfill depending upon the type of material to be excavated and backfilled, the depth of excavation, the amount of space available for operation of equipment, storage of excavated material, proximity of man-made improvements to be protected, available easement or right-of-way and prevailing practice in the area.

1.02 Quality Assurance

- A. Density: All references to "maximum dry density" shall mean the maximum dry density defined by ASTM D 698, except that for cohesion less, free draining soils "maximum dry density" shall mean the maximum index density as determined by ASTM D 4253. Determination of the density of foundation, bedding, haunching, or backfill materials in place shall meet with the requirements of ASTM D 1556, ASTM D 2922 or ASTM D 2937.
- B. Sources and Evaluation Testing: Testing of materials to certify conformance with the Specifications shall be performed by an independent testing laboratory. In accordance with section 01410 of those specifications.

1.03 Safety

- A. Perform all trench excavation and backfilling activities in accordance with the Occupational Safety and Health Act of 1970 (PL 91-596), as amended. The Contractor shall pay particular attention to the Safety and Health Regulations Part 1926, Subpart P "Excavation, Trenching & Shoring" as described in OSHA publication 2226.

Part 2 Products**2.01 Trench Foundation Materials**

- A. Crushed stone shall be utilized for trench foundation (trench stabilization) and shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.
- B. As required by Engineer or field inspector, concrete used for trench foundation shall have a minimum compressive strength of 3000 psi. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94. The minimum thickness of concrete foundation shall be 6 inches.

2.02 Bedding and Haunching Materials

- A. Unless specified otherwise, bedding and haunching materials shall be crushed earth stone material as specified below.
- B. Crushed stone utilized for bedding and haunching shall meet the requirements of the Georgia Department of Transportation Specification 800.01, Group I (limestone, marble or dolomite) or Group II (quartzite, granite or gneiss). Stone size shall be between No. 57 and No. 4, inclusive.

2.03 Initial Backfill

- A. Initial backfill material shall be earth materials or crushed stone as specified for bedding and haunching materials.
- B. Earth materials utilized for initial backfill shall be suitable materials selected from materials excavated from the trench. Suitable materials shall be clean and free of rock larger than 2-inches at its largest dimension, organics, cinders, stumps, limbs, frozen earth or mud, man-made wastes and other unsuitable materials. Should the material excavated from the trench be saturated, the saturated material may be used as earth material, provided it is allowed to dry properly and it is capable of meeting the specified compaction requirements. When necessary, initial backfill materials shall be moistened to facilitate compaction by tamping. If materials excavated from the trench are not suitable for use as initial backfill material, provide select material conforming to the requirements of this Section. at no additional cost to the owner.

2.04 Final Backfill

- A. Final backfill material shall be general excavated earth materials, shall not contain rock larger than 2-inches at its greatest diameter, cinders, stumps, limbs, man-made wastes and other unsuitable materials. If materials excavated from the trench are

not suitable for use as final backfill material, provide select material conforming to the requirements of this Section. at no additional cost to the owner.

2.05 Select Backfill

- A. Select backfill shall be materials which meet the requirements as specified for bedding, haunching, initial backfill or final backfill materials, including compaction requirements.

2.06 Concrete

- A. Concrete for bedding, haunching, initial backfill or encasement shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

2.07 Flowable Fill

- A. Flowable fill, where required for trench backfill, shall meet the requirements of Georgia Department of Transportation Standard Specifications, Section 600 for Excavatable or Non-Excavatable type.

2.08 Granular Material

- A. Granular material, where required for trench backfill, shall be sand, river sand, crushed stone or aggregate, pond screenings, crusher run, recycled concrete, or other angular material. Granular material shall meet gradation requirements for Size No. 57 or finer.

2.09 Filter Fabric [Woven Type]

- A. Filter fabric associated with bedding shall be a polypropylene woven fabric. The fabric shall be a high modulus type with good separation capabilities. The fabric shall be inert to biological degradation and naturally occurring chemicals, alkalies and acids.
- B. The fabric shall have an equivalent opening size (EOS or AOS) of 20 to 45. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Method	Minimum Value
Grab Tensile Strength	lbs.	ASTM D 4632	200
Grab Tensile Elongation	%	ASTM D 4632	30 (max.)
Mullen Burst Strength	psi	ASTM D 3786	400
Trapezoid Tear Strength	lbs.	ASTM D 4533	75
Puncture Strength	lbs.	ASTM D 3787	75

- C. If ordered by the Engineer, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of 10 days during initial pipe installation.
- D. Filter fabric shall be Mirafi 500X, Amoco 2002 or Exxon GTF-200.

2.10 Filter Fabric [Non Woven Type]

- A. Filter fabric associated with bedding shall be a UV stabilized, spunbonded, continuous filament, needlepunched, polypropylene, nonwoven geotextile.
- B. The fabric shall have an equivalent open size (EOS or AOS) of 120 – 70. The fabric shall also conform to the minimum property values listed in the following table:

Fabric Property	Unit	Test Procedure	Average Value	
			Typical	Minimum
Weight	oz/yd ²	ASTM D 3776	8.3	
Thickness	mils	ASTM D 1777	105	
Grab Strength	lbs.	ASTM D 4632	240	210
Grab Elongation	%	ASTM D 4632	>50	50
Tear Strength	lbs.	ASTM D 4533	100	85
Mullen Burst	psi	ASTM D 3786	350	320
Puncture Resistance	lbs.	ASTM D 4833	115	100
Permittivity	sec-1	ASTM D 4491	1.7	
Water Permeability	cm/sec	ASTM D 4491	0.4	
Water Flow Rate	gpm/ft ²	ASTM D 4491	120	
UV Resistance (500 hrs)	%	ASTM D 4355	>85	
Ph			2 - 13	

- C. If ordered by the Engineer, the filter fabric manufacturer shall furnish the services of a competent factory representative to supervise and/or inspect the installation of pipe. This service will be furnished for a minimum of 10 days during initial pipe installation.
- D. Filter fabric shall be Polyfelt TS 700, Trevira 1125 or SuPac 7-MP.

Part 3 Execution**3.01 Trench Excavation**

- A. Topsoil and grass shall be stripped a minimum of 6-inches over the trench excavation site and stockpiled separately for replacement over the finished grading areas.
- B. Trenches shall be excavated to the lines and grades shown on the Drawings with the centerlines of the trenches on the centerlines of the pipes and to the dimensions which provide the proper support and protection of the pipe and other structures and accessories.

C. Trench Width for Pipelines

1. The sides of all trenches shall be vertical, as much as possible, to a minimum of one foot above the top of the pipe. Unless otherwise indicated on the Drawings, the maximum trench width shall be equal to the sum of the outside diameter of the pipe plus two feet. The minimum trench width shall be that which allows the proper consolidation of the haunching and initial backfill material.
2. Excavate the top portion of the trench to any width within the construction easement or right-of-way which will not cause unnecessary damage to adjoining structures, roadways, pavement, utilities, trees or private property. Where necessary to accomplish this, provide sheeting and shoring.
3. Where rock is encountered in trenches, excavate to remove boulders and stones to provide a minimum of 69-inches clearance between the rock and any part of the pipe or manhole. The maximum allowable width of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 18-inches, but the total allowable rock excavation width for payment will not be less than 36-inches.
4. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the next higher Class or Type of bedding and haunching as shown on the Drawings for the full trench width as actually cut. The excessive trench width may be due to unstable trench walls, inadequate or improperly placed bracing and sheeting which caused sloughing, accidental over-excavation, intentional over-excavation necessitated by the size of the Contractor's tamping and compaction equipment, intentional over-excavation due to the size of the Contractor's excavation equipment, or other reasons beyond the control of the Engineer or the County.

D. Depth

1. The trenches shall be excavated to the required depth or elevation which allow for the placement of the pipe and bedding to the dimensions shown on the Drawings.
2. Where rock is encountered in trenches for pipelines, excavate to the minimum depth which will provide clearance below the pipe barrel of 8-inches for pipe 21-inches in diameter and smaller and 12-inches for larger pipe and manholes. Remove boulders and stones to provide a minimum of 6-inches clearance between the rock and any part of the pipe, manhole or accessory.

E. Excavated Materials

1. Excavated materials shall be placed adjacent to the work to be used for backfilling as required. Top soil shall be carefully separated and lastly placed in its original location.
2. Excavated material shall be placed sufficiently back from the edge of the excavation to prevent caving of the trench wall, to permit safe access along the trench and not cause any drainage problems. Excavated material shall

be placed so as not to damage existing landscape features or man-made improvements.

3.02 Sheeting, Bracing and Shoring

- A. Sheeting, bracing and shoring shall be performed in the following instances:
 - 1. Where sloping of the trench walls does not adequately protect persons within the trench from slides or cave-ins.
 - 2. In caving ground.
 - 3. In wet, saturated, flowing or otherwise unstable materials. The sides of all trenches and excavations shall be adequately sheeted, braced and shored.
 - 4. Where necessary to prevent damage to adjoining buildings, structures, roadways, pavement, utilities, trees or private properties which are required to remain.
 - 5. Where necessary to maintain the top of the trench within the available construction easement or right-of-way.
- B. In all cases, excavation protection shall strictly conform to the requirements of the Occupational Safety and Health Act of 1970, as amended.
- C. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good, serviceable condition. Size and spacing shall be in accordance with OSHA regulations.
- D. Steel Sheeting and Sheet Piling: Steel sheet piling shall be the continuous interlock type. The weight, depth and section modulus of the sheet piling shall be sufficient to restrain the loads of earth pressure and surcharge from existing foundations and live loads. Procedure for installation and bracing shall be so scheduled and coordinated with the removal of the earth that the ground under existing structures shall be protected against lateral movement at all times. The Contractor shall provide closure and sealing between sheet piling and existing facilities.
- E. Trench Shield: A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the haunching of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield shall be raised in 6-inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be "dragged" with the bottom of the shield extending below the top of the pipe or utility.
- F. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the Engineer it cannot be safely removed or is within three feet of an existing structure, utility, or pipeline. Cut off any sheeting left in place at least two feet below the surface.
- G. Sheet piling within three feet of an existing structure or pipeline shall remain in place, unless otherwise directed by the Engineer.

3.03 Trench Excavation

- A. Definition of Trench Rock: Any material which cannot be excavated with conventional excavating equipment, and is removed by drilling and blasting, and occupies an original volume of at least one cubic yard.
- B. Blasting: Exhaust other practical means of excavating prior to utilizing blasting as a means of excavation. Provide licensed, experienced workmen to perform blasting. Conduct blasting operations in accordance with all existing ordinances and regulations. Protect all buildings and structures from the effects of the blast. Repair any resulting damage. If the Contractor repeatedly uses excessive blasting charges or blasts in an unsafe or improper manner, the Engineer may direct the Contractor to employ an independent blasting consultant to supervise the preparation for each blast and approve the quantity of each charge.
- C. Removal of Rock: Dispose of rock off site that is surplus or not suitable for use as rip rap or backfill.
- D. The Contractor shall notify the Engineer prior to any blasting. Additionally, the Contractor shall notify the Engineer and local fire department before any charge is set.
- E. Following review by the Engineer regarding the proximity of permanent buildings and structures to the blasting site, the Engineer may direct the Contractor to employ an independent, qualified specialty sub-contractor, approved by the Engineer, to monitor the blasting by use of a seismograph, identify the areas where light charges must be used, conduct pre-blast and post-blast inspections of structures, including photographs or videos, and maintain a detailed written log.

3.04 Dewatering Excavations

- A. Dewater excavation continuously to maintain a water level two feet below the bottom of the trench.
- B. Control drainage in the vicinity of excavation so the ground surface is properly pitched to prevent water running into the excavation.
- C. There shall be sufficient pumping equipment, in good working order, available at all times, to remove any water that accumulates in excavations. Where the utility crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provision shall be made for the satisfactory disposal of surface water to prevent damage to public or private property.
- D. In all cases, accumulated water in the trench shall be removed before placing bedding or haunching, laying pipe, placing concrete or backfilling.
- E. Where dewatering is performed by pumping the water from a sump, crushed stone shall be used as the medium for conducting the water to the sump. Sump depth shall be at least two feet below the bottom of the trench. Pumping equipment shall be of sufficient quantity and/or capacity to maintain the water level in the sump two feet below the bottom of the trench. Pumps shall be a type such that intermittent flows can be discharged. A standby pump shall be required in the event the operating pump or pumps clog or otherwise stop operation.

- F. Dewater by use of a well point system when pumping from sumps does not lower the water level two feet below the trench bottom. Where soil conditions dictate, the Contractor shall construct well points cased in sand wicks. The casing, 6 to 10-inches in diameter, shall be jetted into the ground, followed by the installation of the well point, filling casing with sand and withdrawing the casing.

3.05 Trench Foundation and Stabilization

- A. The bottom of the trench shall provide a foundation to support the pipe and its specified bedding. The trench bottom shall be graded to support the pipe and bedding uniformly throughout its length and width.
- B. If, after dewatering as specified above, the trench bottom is spongy, or if the trench bottom does not provide firm, stable footing and the material at the bottom of the trench will still not adequately support the pipe, the trench will be determined to be unsuitable and the Engineer shall then order trench stabilization by directing the Contractor to over excavate trench bottom and fill with crushed stone.
- C. Where the replacement of unsuitable material with crushed stone does not provide an adequate trench foundation, the trench bottom shall be excavated to a depth of at least two feet below the specified trench bottom. Place filter fabric in the bottom of the trench and support the fabric along the trench walls until the trench stabilization, bedding, haunching and pipe have been placed at the proper grade. The ends of the filter fabric shall be overlapped above the pipe.
- D. Where trench stabilization is provided, the trench stabilization material shall be compacted to at least 90 percent of the maximum dry density, unless shown or specified otherwise.

3.06 Bedding and Haunching

- A. Prior to placement of bedding material, the trench bottom shall be free of any water, loose rocks, boulders or large dirt clods.
- B. Bedding material shall be placed to provide uniform support along the bottom of the pipe and to place and maintain the pipe at the proper elevation. The initial layer of bedding placed to receive the pipe shall be brought to the grade and dimensions indicated on the Drawings. All bedding shall extend the full width of the trench bottom. The pipe shall be placed and brought to grade by tamping the bedding material or by removal of the excess amount of the bedding material under the pipe. Adjustment to grade line shall be made by scraping away or filling with bedding material. Wedging or blocking up of pipe shall not be permitted. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade shall not be permitted.
- C. Each pipe section shall have a uniform bearing on the bedding for the length of the pipe, except immediately at the joint.
- D. At each joint, excavate bell holes of ample depth and width to permit the joint to be assembled properly and to relieve the pipe bell of any load.
- E. After the pipe section is properly placed, add the haunching material to the specified depth. The haunching material shall be shovel sliced, tamped, vigorously chinked or otherwise consolidated to provide uniform support for the pipe barrel and to fill completely the voids under the pipe, including the bell hole. Prior to placement of

the haunching material, the bedding shall be clean and free of any water, loose rocks, boulders or dirt clods.

- F. Bedding shall conform to the individual requirements for the pipe or conduit material being used. Unless otherwise specified or shown on the Drawings, bedding shall be Class D type 3.
- G. Manholes: Excavate to a minimum of 6-inches below the planned elevation of the base of the manhole. Place and compact crushed stone bedding material to the required grade before constructing installing the manhole.
- H. Excessive Width and Depth
 - 1. If the trench is excavated to excess width, provide the next higher type or class of pipe bedding, as detailed on the Drawings.
 - 2. If the trench is excavated to excessive depth, provide crushed stone to place the bedding at the proper elevation or grade.
- I. Compaction: Bedding and haunching materials under pipe, manholes and accessories shall be compacted to a minimum of 90 percent of the maximum dry density, unless shown or specified otherwise.

3.07 Initial Backfill

- A. Initial backfill shall be placed to anchor the pipe, protect the pipe from damage by subsequent backfill and ensure the uniform distribution of the loads over the top of the pipe.
- B. Place initial backfill material carefully around the pipe in uniform layers to a depth of at least 1212-inches above the pipe barrel. Layer depths shall be a maximum of 6-inches for pipe 18-inches in diameter and smaller and a maximum of 12-inches for pipe larger than 18-inches in diameter.
- C. Backfill on both sides of the pipe simultaneously to prevent side pressures.
- D. Compact each layer thoroughly with suitable hand tools or tamping equipment.
- E. Initial backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless shown or specified otherwise.
- F. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section for initial backfill.

3.08 Concrete Encasement for Pipelines

- A. Where concrete encasement is shown on the Drawings for pipelines, excavate the trench to provide a minimum of 6-inches clearance from the barrel of the pipe. Lay the pipe to line and grade on solid concrete blocks or solid bricks. In lieu of bedding, haunching and initial backfill, place concrete to the full width of the trench and to a height of not less than 6-inches above the pipe bell. Do not backfill the trench for a period of at least 24 hours after concrete is placed.

3.09 Final Backfill

- A. Backfill carefully to restore the ground surface to its original grade and condition.
- B. The top 6-inches shall be topsoil obtained as specified in "Trench Excavation" of this Section.
- C. Excavated material which is unsuitable for backfilling, and excess material, shall be disposed of in a manner approved by the Engineer. Surplus soil may be neatly distributed and spread over the site, if approved by the Engineer, except that surplus soil shall not be distributed and spread over the site in areas under Corps of Engineers jurisdiction. If such spreading is allowed, the site shall be left in a clean and sightly condition and shall not affect pre-construction drainage patterns. Surplus rock from the trenching operations shall be removed from the site.
- D. If materials excavated from the trench are not suitable for use as backfill materials, provide select backfill material conforming to the requirements of this Section.
- E. After initial backfill material has been placed and compacted, backfill with final backfill material. Place backfill material in uniform layers, compacting each layer thoroughly as follows:
 - 1. In 6-inch layers, if using light power tamping equipment, such as a "jumping jack".
 - 2. In 12-inch layers, if using heavy tamping equipment, such as hammer with tamping feet.
 - 3. In 24-inch layers, if using a hydra-hammer.
- F. Settlement: If trench settles, re-fill, compact and grade the surface to conform to the adjacent surfaces.
- G. Final backfill shall be compacted to a minimum 90 percent of the maximum dry density, unless specified otherwise.

3.10 Additional Material

- A. Where final grades above the pre-construction grades are required to maintain minimum cover, additional fill material will be as shown on the Drawings. Utilize excess material excavated from the trench, if the material is suitable. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide additional suitable fill material.

3.11 Backfill Within Right-of- Ways

- A. Compact backfill underlying pavement and sidewalks, and backfill under dirt and gravel roads to a minimum 95 percent of the maximum dry density.

3.12 Backfill Within Georgia DOT Right-of-Way

- A. Backfill within the Georgia DOT right-of-way shall meet the requirements stipulated in the "Utility Accommodation Policy and Standards", published by the Georgia Department of Transportation.

3.13 Flowable Fill

- A. Where flowable fill is required, excavate the trench to provide a minimum of 6-inches clearance on either side of the pipe barrel. Lay the pipe to line and grade on solid concrete blocks or bricks. In lieu of bedding, haunching and initial backfill, place flowable fill to the full width and depth of the trench.
- B. Flowable fill shall be protected from freezing for a period of 36 hours after placement. Minimum temperature of flowable fill at point of delivery shall be 50 degrees F.
- C. The Contractor shall provide steel plates over flowable fill in road locations.

3.14 Compacted Granular Material

- A. Where compacted granular material is required as initial and final backfill material, it shall be placed after bedding and haunching material specified elsewhere has been placed. Compacted granular material shall be compacted to a minimum 95 percent of the maximum dry density.

3.15 Testing and Inspection

- A. The soils testing laboratory is responsible for the following:
 - 1. Compaction tests in accordance with Article 1.02 of this Section.
 - 2. Field density tests for each two feet of lift, one test site between each 2000 feet of pipe installed, manhole, every 100 feet within road rights-of-way, or more frequently if ordered by the Engineer. The County shall direct where density tests will be performed along the Project route.
 - 3. Inspecting and testing stripped site, subgrades and proposed fill materials.
- B. The Contractor's duties relative to testing include:
 - 1. Notifying laboratory of conditions requiring testing.
 - 2. Coordinating with laboratory for field testing.
 - 3. Paying costs for additional testing performed beyond the scope of that required and for re-testing where initial tests reveal non-conformance with specified requirements.
 - 4. Providing excavation as necessary for laboratory personnel to conduct tests.
- C. Inspection
 - 1. Earthwork operations, Acceptability of excavated materials for bedding or backfill, and placing and compaction of bedding and backfill is subject to inspection by the Engineer.
 - 2. Foundations and shallow spread footing foundations are required to be inspected by a geotechnical engineer, who shall verify suitable bearing and construction.

3. Comply with applicable codes, ordinances, rules, regulations and laws of local, municipal, state or federal authorities having jurisdiction

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END OF SECTION

Part 1 General**1.01 Scope**

- A. The work covered by this Section includes furnishing all labor, materials and equipment required to bore and jack casings and to properly complete pipeline construction as described herein and/or shown on the Drawings.
- B. Supply all materials and perform all work in accordance with applicable American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI) or other recognized standards. Latest revisions of all standards are applicable. If requested by the Engineer, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

1.02 Submittals

- A. Submit shop drawings, product data and experience as requested by the County or Engineer.
- B. Material Submittals: If required by the County or Engineer, the Contractor shall provide shop drawings and other pertinent specifications and product data as follows:
 - 1. Shop drawings for casing pipe showing sizes and connection details.
 - 2. Design mixes for concrete and grout.
 - 3. Casing Spacers.
- C. Experience Submittals: Boring and jacking casings is deemed to be specialty contractor work. If the Contractor elects to perform the work, the Contractor shall provide evidence as required by the General Conditions, if ordered by the County or Engineer. A minimum of five continuous years of experience in bore and jack casing construction is required of the casing installer. Evidence of this experience must be provided with the shop drawings for review by the Engineer.

1.03 Storage and Protection

- A. All materials shall be stored and protected in accordance with the manufacturer's recommendations and as approved by the Engineer.

Part 2 Products**2.01 Materials and Construction**

- A. Casing
 - 1. The casing shall be new and unused pipe. The casing shall be made from steel plate having a minimum yield strength of 35,000 psi. The steel plate shall also meet the chemical requirements of ASTM A 139, Grade
 - 2. The thicknesses of casing shown in paragraph B. below are minimum thicknesses. Actual thicknesses shall be determined by the casing installer, based on its evaluation of the required forces to be exerted on

the casing when jacking. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the County.

3. The diameters of casing shown in paragraph B. below and shown on the Drawings are minimum. Larger casings, with the Engineer's approval, may be provided at no additional cost to the County, for whatever reasons the Contractor may decide, whether casing size availability, line and grade tolerances, soil conditions, etc.

B. Casing Sizes

UNDER HIGHWAYS/ STREETS		
Pipe Diameter, inches	Casing Diameter, inches	Wall Thickness, inches
6	12	0.250
8	16	0.250
10	16	0.250
12	18	0.250
14	22	0.250
16	24	0.250
18	30	0.312
20	30	0.312
24	36	0.375
30	42	0.375
36	48	0.500
42	56	0.500
48	60	0.500
54	66	0.750
60	72	0.750
64	78	1.000

C. Casing Spacers: Casing spacers shall meet one of the following requirements:

1. Casing spacers shall be flanged, bolt on style with a two section stainless steel shell lined with a PVC liner, minimum 0.09 inch thick also having a hardness of 85 90 durometer. Runners shall be attached to stainless steel risers which shall be properly welded to the shell. The height of the runners and risers shall be manufactured such that the pipe does not float within the casing. Casing spacers shall be Cascade

Waterworks Manufacturing Company or Advanced Products & Systems, Inc.

2. Casing spacers shall be a two section, flanged, bolt on style constructed of heat fused PVC coated steel, minimum 14 gauge band and 10 gauge risers, with 2 inch wide glass reinforced polyester insulating skids, heavy duty PVC inner liner, minimum 0.09 inch thick having a hardness of 85 90 durometer, and all stainless steel or cadmium plated hardware shall be Pipeline Seal and Insulator, Inc.
- D. Casing Coating: The outside of the casing pipe shall be coated with coal tar poxy having a minimum dry film thickness of 16 mils. Surface preparation shall be SSPC-SP-10. Epoxy shall have a minimum solids content of 65 percent by volume and shall be air or airless spray applied; minimum drying time shall be seven days. Brushing shall be permitted in small areas only. All coating and recoating shall be done in strict accordance with the manufacturer's recommendations. Epoxy shall be Tnemec, Carboline or Valspar.
- E. End Cap: End of casing shall be sealed with 4" brick wall. Brick and mortar shall be as per section 02665.
- F. Carrier Pipe: Carrier pipes shall meet requirements as specified in Section 02665 of these Specifications.
- G. Surface Settlement Markers: Surface settlement markers within pavement areas shall be P.K. nails. Surface settlement markers within non paved areas shall be wooden hubs.

2.02 Equipment

- A. A cutting head shall be attached to a continuous auger mounted inside the casing pipe.
- B. The steering head shall be controlled manually from the bore pit. The grade indicator shall consist of a water level attached to the casing which would indicate the elevation of the front end of the casing or some other means for grade indication approved by the Engineer.

Part 3 Execution

3.01 General

- A. Interpretation of soil investigation reports and data, investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site.
- B. Casing construction shall be performed so as not to interfere with, interrupt or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the casing. Support the ground continuously in a manner that will prevent loss of ground and keep the perimeters and face of the casing, passages and shafts stable. The Contractor shall be responsible for all settlement resulting from casing operations and shall repair and restore damaged property to its original or better condition at no cost to the County.

- C. Face Protection: The face of the excavation shall be protected from the collapse of the soil into the casing.
- D. Casing Design: Design of the bore pit and required bearing to resist jacking forces are the responsibility of the Contractor. The excavation method selected shall be compatible with expected ground conditions. The lengths of the casing shown on the Drawings are the minimum lengths required. The length of the casing may be extended for the convenience of the Contractor, at no additional cost to the County. Due to restrictive right of way and construction easements. Casing lengths less than the nominal 20-foot length may be necessary.
- E. Highway/Streets Crossings
 - 1. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the highway/Street right of way and posting of appropriate permits.
 - 2. Work along or across the highway/street department rights of way shall be subject to inspection by such highway department.
 - 3. All installations shall be performed to leave free flows in drainage ditches, pipes, culverts or other surface drainage facilities of the highway, street or its connections.
 - 4. No excavated material or equipment shall be placed on the pavement or shoulders of the roadway without the express approval of the highway/street department.
 - 5. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight. Construction materials to be installed, which are placed on the right of way in advance of construction, shall be placed in such a manner as not to interfere with the safe operation of the roadway.
 - 6. The Contractor shall be responsible for providing the County sufficient information to obtain a blasting permit in a timely manner.

3.02 Groundwater Control

- A. The Contractor shall control the groundwater throughout the construction of the casing.
- B. Methods of dewatering shall be at the option and responsibility of the Contractor. Maintain close observation to detect settlement or displacement of surface facilities due to dewatering. Should settlement or displacement be detected, notify the Engineer immediately and take such action as necessary to maintain safe conditions and prevent damage.
- C. When water is encountered, provide and maintain a dewatering system of sufficient capacity to remove water on a 24-hour basis keeping excavations free of water until the backfill operation is in progress. Dewatering shall be performed in such a manner that removal of soil particles is held to a minimum. Dewater into a sediment trap and comply with requirements specified in Section 02125 of these Specifications.

3.03 Safety

- A. Provide all necessary bracing, bulkheads and shields to ensure complete safety to all traffic, persons and property at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.
- B. Observe all applicable requirements of the regulations of the authorities having jurisdiction over this site. Conduct the operations in such a manner that all work will be performed below the level of the roadbed.
- C. Perform all activities in accordance with the Occupational Safety and Health Act of 1970 (PL 596), as amended, applicable regulations of the Federal "Safety Requirements for Construction of Tunnel Shafts and Caissons".

3.04 Surface Settlement Monitoring

- A. Provide surface settlement markers for casings 24-inches in diameter and larger. Place marker as specified and as directed by the Engineer. The Contractor shall place settlement markers outside of pavement area, along the centerline of the casing at 20 foot intervals and offset 10 feet each way from the centerline of the casing. Markers shall also be placed at each shoulder of the roadway, at each edge of pavement, at the centerline of the pavement and at 10 and 25 feet in each direction from the centerline of the casing. Tie settlement markers to bench marks and indices sufficiently removed as not to be affected by the casing operations.
- B. Make observations of surface settlement markers, placed as required herein, at regular time intervals acceptable to the Engineer. In the event settlement or heave on any marker exceeds 1 inch, the Contractor shall immediately cease work and using a method approved by the Engineer and the authority having jurisdiction over the project site, take immediate action to restore surface elevations to that existing prior to start of casing operations.
- C. Take readings and permanently record surface elevations prior to start of dewatering operations and/or shaft excavation. The following schedule shall be used for obtaining and recording elevation readings: all settlement markers, once a week; all settlement markers within 50 feet of the casing heading, at the beginning of each day; more frequently at the Engineer's direction if settlement is identified. Make all elevation measurements to the nearest 0.01 foot.
- D. The Contractor shall cooperate fully with jurisdictional personnel. Any settlement shall be corrected by, and at the expense of, the Contractor.
- E. Promptly report any settlement and horizontal movement immediately to the Engineer and take immediate remedial action.

3.05 Casing Installation

- A. Shaft
 - 1. Conduct boring and jacking operations from a shaft excavated at one end of the section to be bored. Where conditions and accessibility are suitable, place the shaft on the downstream end of the bore.

2. The shaft shall be rectangular and excavated to a width and length required for ample working space. If necessary, sheet and shore shaft properly on all sides. Shaft sheeting shall be timber or steel piling of ample strength to safely withstand all structural loadings of whatever nature due to site and soil conditions. Keep preparations dry during all operations. Perform pumping operations as necessary.
 3. The bottom of the shaft shall be firm and unyielding to form an adequate foundation upon which to work. In the event the shaft bottom is not stable, excavate to such additional depth as required and place a gravel sub base or a concrete sub base if directed by the Engineer due to soil conditions.
- B. Jacking Rails and Frame
1. Set jacking rails to proper line and grade within the shaft. Secure rails in place to prevent settlement or movement during operations. The jacking rails shall cradle and hold the casing pipe on true line and grade during the progress of installing the casing.
 2. Place backing between the heels of jacking rails and the rear of the shaft. The backing shall be adequate to withstand all jacking forces and loads.
 3. The jacking frame shall be of adequate design for the magnitude of the job. Apply thrust to the end of the pipe in such a manner to impart a uniformly balanced load to the pipe barrel without damaging the joint ends of the pipe.
- C. Boring and jacking of casing pipes shall be accomplished by the dry auger boring method without jetting, sluicing or wetboring.
- D. Auger the hole and jack the casing through the soil simultaneously.
- E. Bored installations shall have a bored hole diameter essentially the same as the outside diameter of the casing pipe to be installed.
- F. Execute boring ahead of the casing pipe with extreme care, commensurate with the rate of casing pipe penetration. Boring may proceed slightly in advance of the penetrating pipe and shall be made in such a manner to prevent any voids in the earth around the outside perimeter of the pipe. Make all investigations and determine if the soil conditions are such as to require the use of a shield.
- G. Any casing pipe damaged in jacking operations shall be repaired, if approved by the Engineer, or removed and replaced at Contractor's own expense.
- H. Lengths of casing pipe, as long as practical, shall be used except as restricted otherwise. Joints between casing pipe sections shall be butt joints with complete joint penetration, single groove welds, for the entire joint circumference, in accordance with AWS recommended procedures. Prior to welding the joints, the Contractor shall ensure that both ends of the casing sections being welded are square.
- I. The Contractor shall prepare a contingency plan which will allow the use of a casing lubricant, such as bentonite, in the event excessive frictional forces jeopardize the successful completion of the casing installation.

- J. Once the jacking procedure has begun, it should be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.
- K. Care shall be taken to ensure that casing pipe installed by boring and jacking method will be at the proper alignment and grade.
- L. The Contractor shall maintain and operate pumps and other necessary drainage system equipment to keep work dewatered at all times.
- M. Adequate sheeting, shoring and bracing for embankments, operating pits and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously. Upon completion of the required work, the sheeting, shoring and bracing shall be left in place, cut off or removed, as designated by the Engineer.
- N. Trench excavation, all classes and type of excavation, the removal of rock, muck, debris, the excavation of all working pits and backfill requirements of Section 02225 are included under this Section.
- O. All surplus material shall be removed from the right of way and the excavation finished flush with the surrounding ground.
- P. Grout backfill shall be used for unused holes or abandoned pipes.
- Q. Any replacement of carrier pipe in an existing casing shall be considered a new installation, subject to the applicable requirements of these Specifications.

3.06 Free Boring

- A. Where the Drawings indicate a pipeline is to be installed by boring without casing, the Contractor shall construct the crossing by the free bore method. The free bore method shall be accomplished by the dry auger boring method without jetting, sluicing, or wet boring.
- B. The diameter of the free bore shall not exceed the pipe bell outside diameter or the pipe barrel outside diameter plus 1 inch, whichever is greater.
- C. Free boring, where indicated on the Drawings, is to be performed at the Contractor's option. The Contractor may choose to construct the crossing by the conventional bore and jack casing methodology.
- D. The Contractor shall be responsible for any settlement of the roadway caused by the free bore construction activities.
- E. If the Contractor elects to free bore, and an acceptable installation does not result for any reason, the Contractor shall install a casing pipe by the bore and jack method at no additional cost to the Owner.

3.07 Ventilation and Air Quality

- A. Provide, operate and maintain for the duration of casing project a ventilation system to meet safety and OSHA requirements.

3.08 Rock Excavation

- A. In the event that rock is encountered during the installation of the casing pipe which, in the opinion of the Engineer, cannot be removed through the casing, the Engineer may authorize the Contractor to complete the crossing by a method established in a change order.
- B. At the Contractor's option, the Contractor may continue to install the casing and remove the rock through the casing at no additional cost to the County.

3.09 Installation of Pipe

- A. After construction of the casing is complete, and has been accepted by the Engineer, install the pipeline in accordance with the Drawings and Specifications.
- B. Check the alignment and grade of the casing and prepare a plan to set the pipe at proper alignment, grade and elevation, without any sags or high spots.
- C. The carrier pipe shall be held in the casing pipe by one of the following methods:
 - 1. The carrier pipe shall be held in the casing pipe by the use of hardwood blocks spaced radially around the pipe and secured together so that they remain firmly in place. The spacing of such blocks longitudinally in the casing pipe shall not be greater than 10 feet. Provide a minimum of two casing spacers per nominal length of pipe.
 - 2. The pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1 inch. Provide a minimum of one casing spacer per nominal length of pipe. Casing spacers shall be attached to the pipe at maximum 18 to 20 foot intervals.
- D. Close the ends of the casing with 4 inch brick walls.

3.10 Sheeting Removal

- A. Remove sheeting used for shoring from the shaft and off the job site. The removal of sheeting, shoring and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties and also to avoid cave ins or sliding in the banks.

END OF SECTION

Part 1 General**1.01 Scope**

- A. The work to be performed under this Section shall consist of removing and replacing existing pavement, sidewalks and curbs in paved areas where such have been removed for construction of utilities and appurtenances.
- B. Existing pavement, sidewalks and curbs shall be replaced to the current County standards or to match existing, whichever is more stringent.

1.02 Submittals

- A. If required by the County or Engineer, provide certificates stating that materials supplied comply with Specifications. Certificates shall be signed by the asphalt producer and the Contractor.

1.03 Conditions

- A. Weather Limitations
 - 1. Apply bituminous tack coat only when the ambient temperature has been at least 50 degrees F for 12 hours immediately prior to application.
 - 2. Do not conduct paving operations when surface is wet or contains excess of moisture which would prevent uniform distribution and required penetration.
 - 3. Construct asphaltic courses only when atmospheric temperature in the shade is above 40 degrees F, when the underlying base is dry and when weather is not rainy.
 - 4. Place base course when air temperature is above 35 degrees F and rising.
- B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

Part 2 Products**2.01 Materials and Construction**

- A. Graded Aggregate Base Course: Graded aggregate base course shall be of uniform quality throughout and shall meet the requirements of Section 815.01 of the Georgia Department of Transportation Standard Specifications.
- B. Black Base: Black base course shall be of uniform quality throughout and shall conform to the requirements of Section 828 of the Georgia Department of Transportation Standard Specifications.
- C. Bituminous Tack Coat: The bituminous tack coat shall conform to the requirements of Section 400 of the Georgia Department of Transportation Standard Specifications.

- D. Surface Course: The surface course for all asphaltic concrete pavement shall conform to the requirements of Section 400, Type "E" of the Georgia Department of Transportation Standard Specifications.
- E. Concrete: Provide concrete and reinforcing for concrete pavement or base courses in accordance with the requirements of the Georgia Department of Transportation Standard Specifications, Section 430. Concrete shall be of the strength classifications shown on the Drawings.
- F. Special Surfaces: Where driveways or roadways are disturbed or damaged which are constructed of specialty type surfaces, e.g., brick or stone, these driveways and roadways shall be restored utilizing similar, if not original, materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

2.02 Types of Pavements

- A. General: All existing pavement removed, destroyed or damaged by construction shall be replaced with the same type and thickness of pavement as that existing prior to construction, unless otherwise directed by the Engineer. Materials, equipment and construction methods used for paving work shall conform to the Georgia Department of Transportation specifications applicable to the particular type required for replacement, repair or new pavements.
- B. Aggregate Base: Aggregate base shall be constructed in accordance with the requirements of Section 310 of the Georgia Department of Transportation Standard Specifications. The maximum thickness to be laid in a single course shall be 6 inches compacted. If the design thickness of the base is more than 6 inches, it shall be constructed in two or more courses of approximate equal thickness. After the material placed has been shaped to line, grade and cross section, it shall be rolled until the course has been uniformly compacted to at least 100 percent of the maximum dry density when Group 2 aggregate is used, or to at least 98 percent of maximum dry density when Group 1 aggregate is used.
- C. Concrete Pavement: Concrete pavement or base courses shall be replaced with concrete. The surface finish of the replaced concrete pavement shall conform to that of the existing pavement. The surface of the replaced concrete base course shall be left rough. The slab depth shall be equivalent to the existing concrete pavement or base course, but in no case less than 6 inches thick. Transverse and longitudinal joints removed from concrete pavement shall be replaced at the same locations and to the same types and dimensions as those removed. Concrete pavements or concrete base courses shall be reinforced.
- D. Asphaltic Concrete Base, Bituminous Tack Coat and Surface Course: Asphaltic concrete base, tack coat and surface course construction shall conform to Georgia Department of Transportation Standard Specifications, Section 400. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry and the tack coat has been applied. Apply and compact the base in maximum layer thickness by asphalt spreader equipment of design and operation approved by the Engineer. After compaction, the black base shall be smooth and true to established profiles and sections. Apply and compact the surface course in a manner approved by the Engineer. Immediately correct any high, low or

defective areas by cutting out the course, replacing with fresh hot mix, and immediately compacting to conform and thoroughly bond to the surrounding area.

- E. Surface Treatment Pavement: Bituminous penetration surface treatment pavement shall be replaced with a minimum thickness of 1 inch conforming to Section 424, Georgia Department of Transportation Standard Specifications.
- F. Gravel Surfaces: Existing gravel road, drive and parking area replacement shall meet the requirements of graded aggregate base course. This surfacing may be authorized by the Engineer as a temporary surface for paved streets until replacement of hard surfaced pavement is authorized.
- G. Temporary Measures: During the time period between pavement removal and complete replacement of permanent pavement, maintain highways, streets and roadways by the use of steel running plates anchored to prevent movement. The backfill above the pipe shall be compacted, as specified in Section 02225 of these Specifications, up to the existing pavement surface to provide support for the steel running plates. All pavement shall be replaced within seven calendar days of its removal.

Part 3 Execution

3.01 Locations for Pavement Replacement

- A. Pavement Replacement (see Detail No. 905) shall be used for all pavement replacement.
- B. "Graded Aggregate" pavement repair shall be used only where approved by the Engineer.

3.02 Removing Pavement

- A. General: Remove existing pavement as necessary for installing the pipe line and appurtenances.
- B. Marking: Before removing any pavement, mark the pavement neatly paralleling pipe lines and existing street lines. Space the marks the width of the trench.
- C. Breaking: Break asphalt pavement along the marks using pavement shearing equipment, jack hammers or other suitable tools. Break concrete pavement along the marks by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.
- D. Machine Pulling: Do not pull pavement with machines until the pavement is completely broken and separated from pavement to remain.
- E. Damage to Adjacent Pavement: Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
- F. Sidewalk: Remove and replace any sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.
- G. Curbs: Tunnel under or remove and replace any curb disturbed by construction to the nearest undisturbed joint.

3.03 Replacing Pavement

- A. Preparation of Subgrade: Upon completion of backfilling and compaction of the backfill, arrange to have the compaction tested by an independent testing laboratory approved by the Engineer. After compaction testing has been satisfactorily completed, replace all pavements, sidewalks and curbs removed.
1. The existing street pavement or surface shall be removed along the lines of the work for the allowable width specified for the trench or structure. After the installation of the sewerage or water works facilities and after the backfill has been compacted suitably, the additional width of pavement to be removed, as shown on the Drawings, shall be done immediately prior to replacing the pavement.
 2. Trench backfill shall be compacted for the full depth of the trench as specified in Section 02225 of these Specifications.
 3. Temporary trench backfill along streets and driveways shall include 6 inches of crushed stone or cherty clay as a temporary surfacing of the trenches. This temporary surface shall be maintained carefully at grade and dust free by the Contractor until the backfill of the trench has thoroughly compacted in the opinion of the Engineer and permission is granted to replace the street pavement.
 4. When temporary crushed stone or chert surface is considered by the Engineer to be sufficient surface for gravel pavement, the surface shall be graded smooth and to an elevation that will make the final permanent surfacing level with the adjacent surfacing that was undisturbed.
- B. Pavement Replacement
1. Prior to replacing pavement, make a final cut in concrete pavement 9 inches back from the edge of the damaged pavement with a concrete saw. Remove asphalt pavement 9 inches back from the edge of the damaged pavement using pavement shearing equipment, jack hammers or other suitable tools. Pavement cuts shall be parallel or perpendicular to the road centerline as much as practical. On parallel installations the final cut shall be long and straight and consistent.
 2. Replace all street and roadway pavement as shown on the Drawings. Replace driveways, sidewalks and curbs with the same material, to nearest existing undisturbed construction joint and to the same dimensions as those existing.
 3. If the temporary crushed stone or chert surface is to be replaced, the top 6 inches shall be removed and the crushed stone surfacing for unpaved streets or the base for the bituminous surface shall be placed.
 4. Following this preparation, the chert or crushed stone base shall be primed with a suitable bituminous material and surfaced with the proper type of bituminous surface treatment.
 5. Where the paved surface is to be replaced with asphaltic concrete pavement, concrete pavement or with a concrete base and a surface course, the temporary chert or crushed stone surface and any necessary

backfill material, additional existing paving and new excavation shall be removed to the depth and width shown on the Drawings. All edges of the existing pavement shall be cut to a straight, vertical edge. Care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Concrete base slabs and crushed stone bases, if required, shall be placed and allowed to cure for three days before bituminous concrete surface courses are applied. Expansion joints, where applicable, shall be replaced in a manner equal to the original joint.

6. Where driveways or roadways, constructed of specialty type surfaces, e.g., brick or stone are disturbed or damaged, these driveways and roadways shall be restored utilizing similar materials. Where the nature of these surfaces dictate, a specialty contractor shall be used to restore the surfaces to their previous or better condition. Special surfaces shall be removed and replaced to the limits to which they were disturbed.

C. Pavement Resurfacing

1. Certain areas to be resurfaced are specified or noted on the Drawings. Where pavement to be resurfaced has been damaged with potholes, the Contractor shall remove all existing loose pavement material and fill the hole with black base, as specified, to the level of the existing pavement. After all pipe line installations are complete and existing pavement has been removed and replaced along the trench route, apply tack coat and surface course as specified.
2. Resurfacing limits shall be perpendicular to the road centerline. The limits of resurfacing shall be 10 feet beyond the edge of the pavement replacement on the main road being resurfaced, and to the point of tangency of the pavement on the side streets.

- D. Pavement Striping: Pavement striping removed or paved over shall be replaced with the same type, dimension and material as original unless directed otherwise by the Engineer.

3.04 Sidewalk and Curb Replacement

A. Construction

1. All concrete sidewalks and curbs shall be replaced with concrete.
2. Preformed joints shall be 1/2 inch thick, conforming to the latest edition of AASHTO M 59 for sidewalks and AASHTO M 123 for curbs.
3. Forms for sidewalks shall be of wood or metal, shall be straight and free from warp, and shall be of sufficient strength, when in place, to hold the concrete true to line and grade without springing or distorting.
4. Forms for curbs shall be metal and of an approved section. They shall be straight and free from distortions, showing no vertical variation greater than 1/8 inch in 10 feet and no lateral variation greater than 1/4 inch in 10 feet from the true plain surface on the vertical face of the form. Forms shall be of the full depth of the structure and constructed such to permit the inside forms to be securely fastened to the outside forms.

5. Securely hold forms in place true to the lines and grades indicated on the Drawings or to match existing.
 6. Wood forms may be used on sharp turns and for special sections, as approved by the Engineer. Where wooden forms are used, they shall be free from warp and shall be the nominal depth of the structure.
 7. All mortar and dirt shall be removed from forms and all forms shall be thoroughly oiled or wetted before any concrete is deposited.
- B. When a section is removed, the existing sidewalk or curb shall be cut to a neat line, perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing construction joints; if such joints do not exist, the cut shall be made five feet back.
- C. Existing concrete sidewalks and curbs that have been cut and removed for construction purposes shall be replaced with the same width and surface as the portion removed. Sidewalks shall have a minimum uniform thickness of 4 inches. The new work shall be neatly jointed to the existing concrete so that the surface of the new work shall form an even, unbroken plane with the existing surfaces.
- D. The subgrade shall be formed by excavating to a depth equal to the thickness of the concrete, plus 2 inches. Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrades shall be compacted by hand tamping or rolling. Soft, yielding or unstable material shall be removed and backfilled with satisfactory material. Place 2 inches of porous crushed stone under all sidewalks and curbs and compacted thoroughly, then finish to a smooth, unyielding surface at proper line, grade and cross section.
- E. Joint for Curbs
1. Joints shall be constructed to match existing and as specified. Construct joints true to line with their faces perpendicular to the surface of the structure and within 1/4 inch of their designated position.
 2. Thoroughly spade and compact the concrete at the faces of all joints filling all voids.
 3. Install expansion joint materials at the point of curve at all street returns. Install expansion joint material behind the curb at abutment to sidewalks and adjacent structures.
 4. Place contraction joints every 10 feet along the length of the curbs and gutters. Form contraction joints using steel templates or division plates which conform to the cross section of the structure. Leave the templates in place until the concrete has set sufficiently to hold its shape, but remove them while the forms are still in place. Contraction joint templates or plates shall not extend below the top of the steel reinforcement or they shall be notched to permit the reinforcement to be continuous through the joint. Contraction joints shall be a minimum of 1 1/2 inches deep.
- F. Expansion joints shall be required to replace any removed expansion joints or in new construction wherever shown on the Drawings. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within 1/2 inch of the top of finished concrete surface.

G. Finishing

1. Strike off the surface with a template and finish the surface with a wood float using heavy pressure, after which, contraction joints shall be made and the surface finished with a wood float or steel trowel.
2. Finish the face of the curbs at the top and bottom with an approved finishing tool of the radius to match existing.
3. Finish edges with an approved finishing tool having a 1/4 inch radius.
4. Provide a final broom finish by lightly combing with a stiff broom after troweling is complete.
5. The finished surface shall not vary more than 1/8 inch in 10 feet from the established grade.

H. Driveway and Sidewalk Ramp Openings

1. Provide driveway openings of the widths and at the locations indicated on the Drawings and as directed by the Engineer or to match existing.
2. Provide sidewalk ramp openings to match existing in conformance with the applicable regulations and as directed by the Engineer. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured. Provide necessary barricades to protect the work. All damage caused by people, vehicles, animals, rain, the Contractor's operations and the like shall be repaired by the Contractor, at no additional expense to the County.

3.05 Maintenance

- A. The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the Project. Maintenance shall include replacement, scraping, reshaping, wetting and rerolling as necessary to prevent raveling of the road material, the preservation of reasonably smooth surfaces and the repair of damaged or unsatisfactory surfaces, to the satisfaction of the Engineer. Maintenance shall include sprinkling as may be necessary to abate dust from the gravel surfaces.

3.06 Supervision and Approval

- A. Pavement restoration shall meet the requirements of the regulatory agency responsible for the pavement. Obtain agency approval of pavement restorations before requesting final payment.
- B. Obtain the Engineer's approval of restoration of pavement, such as private roads and drives, that are not the responsibility of a regulatory agency.
- C. Complete pavement restoration as soon as possible after backfilling.
- D. Failure of Pavement: Should any pavement restoration or repairs fail or settle during the life of the Contract, including the bonded period, promptly restore or repair defects.

3.07 Cleaning

- A. The Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights of way and shall restore street, roadway or sidewalk surfacing to its original condition.

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END OF SECTION

Part 1 General**1.01 Scope**

- A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.
- B. Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

1.02 Qualifications

- A. Submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

1.03 Submittals

- A. Complete product data and engineering data, including shop drawings, shall be submitted to the Engineer in accordance with the requirements of Section 01340 of the Contract Documents.

1.04 Transportation and Handling

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.05 STORAGE AND PROTECTION

- A. Store all pipes which cannot be distributed along the route. Make arrangements for the use of secured and covered storage areas.
- B. Stored materials shall be kept safe from damage. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.
- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipes in adjacent tiers.

- D. Stored mechanical and push on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first in, first out basis.
- E. Mechanical joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

1.06 Quality Assurance

- A. The manufacturer shall provide written certification to the Engineer that all products furnished comply with all applicable requirements of these Specifications.

Part 2 Products

2.01 Ductile Iron Pipe

- A. Ductile iron pipe shall be manufactured in accordance with AWWA C151. All pipes, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipes shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 18	350
20	300
24	250
30 - 54	200
60 - 64	200

- B. Flanged pipe minimum wall thickness shall be equal to Special Class 53. Flanges shall be furnished by the pipe manufacturer.
- C. Interior of all pipes shall be lined with cement – mortar in accordance with AWWA C104 (ANSI 21.4) of latest revision. A seal coat over the cement lining is not required. Interior fittings shall be lined with cement – mortar with double thickness as per AWWA C104. Pipes and fittings shall be furnished with an outside coating of bituminous approximately 1 Mil. thickness.
- D. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi.
- E. Joints
 - 1. Unless shown or specified otherwise, joints shall be push on or restrained joint type for pipe and standard mechanical, push on or restrained joints for fittings. Push on and mechanical joints shall conform to AWWA C111.
 - 2. The only acceptable restrained joint systems are identified in the table below. No field welding of restrained joint pipe will be allowed.

Acceptable Restrained Joints				
Size	ACIPCO	U.S. Pipe	McWane	Generic*
4 - 12	Fast-Grip Flex Ring	Field Lok TR Flex	Push-On Restrained Joint Type A	MJ with Retainer Gland
16 - 24	Fast-Grip Flex Ring	Field Lok TR Flex	Push-On Restrained Joint Type A	MJ with Retainer Gland
30 - 36	Flex Ring	TR Flex	Push-On Restrained Joint Type B	MJ with Retainer Gland
42 - 48	Lok-Ring	TR Flex	N/A	MJ with Retainer Gland
54 - 64	Lok-Ring	TR Flex	N/A	N/A

* Fittings and valves only, and only where specifically allowed.

3. Restrained joint pipe (RJP) on supports shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet.
 4. Flanged joints shall meet the requirements of ANSI B16.1, Class 125.
- F. Provide the appropriate gaskets for mechanical and flange joints. Gaskets for flange joints shall be made of 1/8 inch thick, cloth reinforced rubber; gaskets may be ring type or full face type.
- G. Bolts and Nuts
1. Provide the necessary bolts for connections. All bolts and nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A external and 2B internal fit. All bolts and nuts shall be made in the U.S.A.
 2. Bolts and nuts for mechanical joints shall be Tee Head Bolts and nuts of high strength low alloy steel in accordance with ASTM A 242 to the dimensions shown in AWWA C111/ANSI A21.11.
 3. Flanged joints shall be bolted with through stud or tap bolts of required size as directed. Bolt length and diameter shall conform to ANSI/AWWA C115 for Class 125 flanges shown in ANSI/ASME B16.1.
 4. Bolts for exposed service shall be zinc plated, cold pressed, steel machine bolts conforming to ASTM A 307, Grade B. Nuts for exposed service shall be zinc plated, heavy hex conforming to ASTM A 563. Zinc plating shall conform to ASTM B 633, Type II.
 5. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A 193, Grade B8. Nuts shall be heavy hex, stainless steel conforming to ASTM A 194, Grade 8.

- H. Mechanical joint glands shall be ductile iron.
- I. Welded Outlet: Welded outlets may be provided in lieu of tees or saddles on mains with a diameter greater than or equal to 24-inches. The pipe joint on the outlet pipe shall meet the joint requirements specified above. The minimum pipe wall thickness of the parent pipe and the outlet pipe shall be Special Thickness Class 53 (Pressure Class 350 for 60 and 64-inch sizes). The welded outlet shall be rated for 250 psi working pressure. Each welded outlet shall be hydrostatically tested at 500 psi. The welded outlet shall be fabricated by the manufacturer of the parent pipe. The maximum outlet diameters shall not exceed those listed in the table below:

Parent Pipe Diameter, Inches	Maximum Outlet Diameter, Inches
24	16
30	20
36	24
42	30
48	30
54	30
60	30
64	30

- J. Ductile iron pipe shall be encased with polyethylene film where shown on the Drawings. Polyethylene film shall be in accordance with AWWA C105.
- K. Thrust collars shall be welded on ductile iron body type designed to withstand thrust due to 250 psi internal pressure on a dead end.
- L. Acceptance will be on the basis of the Engineer's inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

2.02 Copper Pipe

- A. Pipe shall be rolled copper tubing, ASTM B 88, Type K.
- B. Where required, sweat to screw adapters shall be cast bronze ANSI B16.18, wrought solder joint ANSI B16.22. Unions shall be cast bronze or bronze with solder connections. Joints shall be made with 95/5 solder for Type K pipe.

2.03 PVC Pipe

- A. When required underground service lines under roadway shall be protected by 6" pvc casing pipe. The minimum depth of cover between the top of the casing pipe and the surface of roadway shall be 36- inches. Casing pipe shall conform to the requirements of ASTM Designation A139, PVC C-960.

2.04 Piping Appurtenances

- A. Retainer Glands

1. Retainer glands shall be Megalug Series 1100, as manufactured by EBAA Iron, or Uni-Flange Series 1400, as manufactured by Ford Meter Box Company.
 2. Retainer glands shall be provided at all mechanical joints, including fittings, valves, hydrants and other locations as shown on the Drawings.
 3. Retainer glands shall be ductile iron and shall be manufactured in the United States. All retainer glands on the project shall be the product of a single manufacturer.
 4. Restraint devices for nominal pipe sizes 3" through 48" shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of AWWA C110 / ANSI A21.10
- B. Hydrant Tees: Hydrant tees shall be equal to ACIPCO A10180 or U.S. Pipe U 592.
- C. Anchor Couplings: Lengths and sizes shall be as shown on the Drawings. Anchor couplings shall be EBAA iron series 3800 or equal.
- D. Hydrant Connector Pipe: The connector pipe shall be ductile iron meeting the requirements of AWWA C153; 24-inch offset design so that the hydrant can be adjusted to ensure placement at the proper grade; shall have an anchoring feature at both ends so that when used with M.J. split glands a restrained joint is provided; cement lined in accordance with AWWA C104 and equal to the Gradelok as manufactured by Assured Flow Sales, Inc., Sarasota, Florida.
- E. Tapping Saddles: Tapping saddles are not allowed.
- F. Detection Tape: Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes with the following legends: Water Systems, Safety Precaution Blue, "Caution Water Line Buried Below". Colors may be solid or striped. Tape shall be permanently printed with no surface printing allowed. Tape width shall be a minimum of 2 inches when buried less than 10 inches below the surface. Tape width shall be a minimum of 3 inches when buried greater than 10 inches and less than 20 inches. Detection tape shall be equal to Line guard Type III Detectable or Allen Systems Detect tape.
- G. Electronic Location Markers: Electronic markers are physical devices installed over pipe that marks the pipe at intermittent locations along the pipe length. The markers should conform to the American Public Works Association (APWA) utility color code and frequency specifications. Contractor shall place electronic markers in backfill directly over water mains 16-inch or greater in diameter at intervals of 50 foot and on bends and valves. Markers shall be 3M Electronic Marker System (EMS) with full-range, mini, ball type, model EMS 1250.

2.05**Gate Valves**

- A. 16-Inches in Diameter and Smaller:
1. Gate valves shall be resilient-seated type conforming to the requirements of AWWA C509 or AWWA C515.

2. Valves through 12-inches in diameter shall have a minimum rated working pressure of 200 psi. 16-inch valves shall have a minimum rated working pressure of 150 psi.
 3. Valves less than 4-inches in diameter shall have threaded ends. Larger valves shall be mechanical joint unless shown otherwise on the Drawings.
 4. Valves shall be non-rising stem type with a 2-inch square wrench nut, and shall open left. The manufacturer shall provide an affidavit of compliance with the applicable AWWA standards.
 5. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550.
 6. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.
 7. Valve disks shall be made of cast or ductile iron having a vulcanized, synthetic rubber coating.
 8. Valves shall be manufactured by American Flow Control, Mueller, or M & H Valve.
- B. 16 Inches in Diameter and Larger:
1. Valves shall be double disc type conforming to the requirements of AWWA C500.
 2. Valves shall be designed for horizontal installation with tracks and rollers, bypass valves, and bevel gear type operator. Valves shall be rated for 150 psi working pressure.
 3. Valve ends shall be mechanical joint type except where restrained joint ends are shown. Flanged joints shall meet the requirements of ANSI B16.1, Class 150.
 4. Buried valves shall be equipped with valve boxes unless access to the operator is provided by a manhole.
 5. Manually operated valves, including geared valves, shall be non rising stem type having O ring seals.
 6. Gate valves 16 inches in diameter and larger shall be manufactured by American R/D Gate Valve Company, Mueller or M & H Valve.

2.06 Butterfly Valves (BV)

- A. Unless indicated on the Drawings to be 250 pound valves, butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of AWWA C504 for Class 150B.
- B. Where butterfly valves are indicated on the Drawings to be 250 pound valves, butterfly valves shall be resilient seated, short body design, and shall be designed, manufactured, and tested in accordance with all requirements of

AWWA C504, and as modified below. Valves shall be designed for a rated working pressure of 250 psi. Class B, AWWA C504 Section 5.2 testing requirements are modified as follows:

1. The leakage test shall be performed at a pressure of 250 psi;
 2. The hydrostatic test shall be performed at a pressure of 500 psi; and
 3. Proof of design tests shall be performed and certification of such proof of design test shall be provided to the Engineer.
- C. 250 Pound Valves: Valve bodies shall be ductile iron conforming to ASTM A 536, Grade 65 45 12 or ASTM A 126, Grade B cast iron. Shafts and shaft hardware shall be ASTM A 564, Type 303 stainless steel, machined and polished. Valve discs shall be ductile iron, ASTM A 536, Grade 65 45 12. The resilient valve seat shall be located either on the valve disc or in the valve body and shall be fully field adjustable and field replaceable.
- D. Valves shall be installed with the valve shafts horizontal. Valves and actuators shall have seals on all shafts and gaskets on valve actuator covers to prevent the entry of water. Actuator mounting brackets shall be totally enclosed and shall have gasket seals.
- E. Actuators
1. Valves shall be equipped with traveling nut, self-locking type actuators designed, manufactured and tested in accordance with AWWA C504. Actuators shall be capable of holding the disc in any position between full open and full closed without any movement or fluttering of the disc.
 2. Actuators shall be furnished with fully adjustable mechanical stop limiting devices. Actuators that utilize the sides of the actuator housing to limit disc travel are unacceptable.
 3. Valve actuators shall be capable of withstanding a minimum of 450 foot pounds of input torque in either the open or closed position without damage.
- F. Operators: Valves for buried service shall have a nut type operator and shall be equipped with a valve box and stem extension, as required. Manual operators for 16" and larger valves shall be of the totally enclosed, oil bath lubricated, gear reduction type. Primary gearing shall consist of a self-locking worm gear constructed of high tensile bronze and another constructed of hardened alloy steel with ground and polished threads.
- G. Valve ends shall be mechanical joint type, except where flanged or restrained joint ends are shown. Flange joints shall meet the requirements of ANSI B16.1, Class 125.
- H. Butterfly valves shall be manufactured by Mueller (Pratt) or DeZurik.
- I. Electric Motor Operator
1. Provide electric motor operator for butterfly valves where indicated on the Drawings.

2. Electric motor operator shall be an actuator designed to work with butterfly valves and shall be rated for 115 volt, single phase service. The actuator shall include the electric motor, reduction gearing, valve stem, drive nut/bushing, position limit switches, mechanical overload torque switches, ductile iron gear case and automatic declutchable handwheel. The actuator shall be capable of opening a 16-inch butterfly valve from a shut-off position under a maximum differential pressure of 180 psi on either side of the valve. Actuator shall be EIM 2000 series or engineer pre-approved equal.
3. Motor speed reduction shall be by means of a gear train consisting of hardened steel spur gears and self-locking worm and worm gear set. The worm shall be heat-treated alloy steel and have worm thread surface rolled or ground. The worm gear shall be bronze. Non-metallic gears in the power train are not acceptable.
4. The actuator shall be furnished with a handwheel located in a 90-degree plane from the actuator output drive, with a maximum rim pull requirement of 60 pounds for valve travel loads. An external manual declutch lever shall be included to place actuator in the manual mode. The lever is to be padlockable in either handwheel or motor mode. Operation by motor shall not cause the handwheel to rotate, or operation of the handwheel shall not cause the motor to rotate. Handwheel shall operate in the clockwise direction to close.
5. Electric motors shall be specifically designed for valve actuator service, and be totally enclosed, non-ventilated. The enclosure shall meet Nema 4 (weatherproof). Motor shall be capable of operation under maximum specified loads when voltage to the motor is +/- 10% of the nominal voltage. Motor shall have Class F insulation with thermal overload sensors imbedded in the motor windings.
6. Limit switches shall be geared to the drive mechanism and in step with actual valve position at all times, whether operation is by power or manual mode. Switches shall be activated by a rotor type design. Contacts shall be silver and have a rating of 10 amps at 120 VAC. A minimum of (3) N.O. and (3) N.C. contacts shall be provided for each direction of travel. The limit switchgear mechanism shall be enclosed to prevent entrance of foreign matter or wire entanglement. Use of cams or screws to set switches or designs requiring battery back-up methods to ensure position control in the event of a power failure, are unacceptable.
7. The actuator shall include an adjustable torque switch to interrupt the motor power circuit when an obstruction is encountered in either direction of travel or when torque seating of valves is required for tight shut off. The torque switch shall have a calibrated dial for adjustment and have means to ensure maximum actuator rating is not exceeded. Mechanical torque springs for load control shall be field replaceable without need of actuator dismantling or removal of the worm assembly.
8. Local position indication for the valve shall be by indicator dial located on the gear operator and graduated in 25 percent increments. When required a 4-20 mA position feed back device shall be provided.

9. As a minimum, the actuator shall be furnished with power and control terminal strips, space heater (25 watt), limit switches, torque switches, all housed in a common control compartment meeting NEMA 4 (weatherproof). The rectangular enclosure shall have a bonded o-ring seal and a hinged cover.
10. When built-in controls are specified they shall be an integrated modular package, completely wired and be easily removable or replaceable, as a complete package, by removal of four (4) captive screws. Motor leads and power supply leads will be terminated to the terminal strips located on the modular package. Power supply terminals (5 points minimum) and control supply terminal (48 points minimum) shall be physically isolated from each other to protect against transient voltages. The terminal strips shall be completely shrouded with high impact resistant plastic to avoid accidental terminal contact by personnel. The module is to include a snubber circuit to provide control voltage protection for switches and electronic modules from voltage surges. All electrical components of the modular package, such as reversing contactor, transformer, etc., shall be unidirectional plug connected to provide easy removal and replacement without concerns for proper wiring connections. All optional control requirements such as modulating control, 2-wire control, interposing relays, etc. shall be plug-in printed circuit type boards having gold plated contact connectors. Unless otherwise specified, all PC boards must be temperature rated -40' to + 70'C. Ease of replacement or upgrading shall be of paramount consideration.
11. Single Phase Modulating Service Controls shall include: (refer to EIM Wiring Diagram M2CP-410) Control voltage shall be 120 volts, 60 or 50 Hz. Normally-opened Seal-in contacts for momentary contact pushbutton control and normally-closed contacts for electrical interlock shall be supplied. Additional auxiliary contacts (I N.O. and I N.C. for open and close coils) shall be supplied. The contactor shall be both electrically and mechanically interlocked. It shall be completely wired as an assembly and plug connected to the modular package.

The transformer assembly shall provide 115, 18 and 12 Vac. It shall be epoxy impregnated and encapsulated to prevent moisture incursion and shall be completely wired as an assembly and plug connected to the modular package.

Each actuator shall be supplied with open-stop-close pushbuttons furnished integrally mounted. Pushbuttons shall be double o-ring sealed and include a protective silicon boot. Seal material shall be resistant to ozone and ultraviolet light.

The actuator shall include a four (4) long life-high intensity LED type pilot lights to indicate (red) open, (green) closed and intermediate valve position (both red and green lamps on); (amber) power is on. The fourth LED pilot light shall be furnished to indicate torque switch trip.

The actuator shall include a 3-position selector switch, for local (hand)-off-remote (auto) control. If specified the switch shall be padlockable in any position.

12. Continuous Duty Modulation Service shall provide up to 1200 starts per hour for both 1 and 3 phase power. 1-phase service actuators shall utilize a 2100-rpm, DC current, Class H insulated motor. The DC motor voltage shall be rectified to 1 phase AC within the actuator control system. All reversing mechanisms shall be of the solid-state type. Single phase. Units shall be EIM Futronic III.
13. Electric motor actuators shall be Series 2000/M2CP by EIM Company or approved equal.

2.07 Fire Hydrants (FH)

- A. All fire hydrants shall conform to the requirements of AWWA C502 for 200 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall be 5-1/4 inches.
- B. In the event of a traffic accident, the hydrant barrel shall break away from the standpipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water.
- C. The means for attaching the barrel to the standpipe shall permit facing the hydrant a minimum of eight different directions
- D. Hydrants shall be fully bronze mounted with all working parts of bronze. Valve seat ring shall be bronze and shall screw into a bronze retainer.
- E. All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.
- F. The operating nut shall match those on the existing hydrants. The operating threads shall be totally enclosed in an operating chamber, separated from the hydrant barrel by a rubber O ring stem seal and lubricated by a grease or an oil reservoir.
- G. Hydrant shall be a non freezing design and be provided with a simple, positive, and automatic drain which shall be fully closed whenever the main valve is opened.
- H. Hose and pumper connections shall be breech locked, pinned, or threaded and pinned to seal them into the hydrant barrel. Each hydrant shall have two 2 1/2 inch hose connections and one 5 1/4 inch pumper connection, all with National Standard threads and each equipped with cap and non kinking chain.
- I. Hydrants shall be furnished with a mechanical joint connection to the spigot of the 6 inch hydrant lead.
- J. Minimum depth to top of pipe shall be 5.0 feet. Provide extension section or hydrant connector pipe where necessary for proper vertical installation and in accordance with manufacturer's recommendations.
- K. All outside surfaces of the barrel above grade shall be painted with silver enamel paint, Sherwin Williams KEM 400 or Kopper Glamortex 501.
- L. Hydrants shall be traffic model with a pressure rating of 250 psi and shall be American Darling B 84 B, Mueller Super Centurion or M & H Valve 929.

2.08 Water Meters

- A. All cold water meters (displacement type – magnetic drive 5/8" -2") furnished shall be produced from an ISO 9001 manufacturing facility and conform to the "Standard Specifications for Cold Water Meters" AWWA C700, latest revision.
- B. Only magnetic-driven, positive displacement meters of the flat nutating disc type will be accepted.
- C. The size, capacity, and meter lengths shall be as specified in AWWA Standard C700 (latest revision). The maximum number of disc nutations is not to exceed those specified in AWWA C700 latest revision.
- D. All meter maincases shall be made of a no-lead high copper alloy containing a minimum of 85% copper that meets the ANSI/NSF 61 standard. The serial number should be stamped between the outlet port of the maincase and the register. Maincase markings shall be cast raised and shall indicate size, model, direction of flow, and NSF 61 certification. Plastic maincases are not acceptable.

Maincases for 5/8", 3/4" and 1" meters shall be of the removable bottom cap type with the bottom cap secured by for (4) bolts on 5/8" and 3/4" sizes and six (6) bolts on the 1" size. Intermediate meter maincases shall also be made of the same lead-free brass material in sizes 1-1/2" and 2" with a cover secured to the maincases with eight (8) bolts. Meters with a frost plug, a screw-on design or no bottom cap shall not be accepted in 5/8"-1" sizes. The 5/8" meters shall have a synthetic polymer or cast iron bottom cap option.

- E. All no-lead maincases shall be guaranteed free from manufacturing defects in workmanship and material for the life of the meter..
- F. All meters must be adaptable to a field programmable absolute encoder register without interruption of the customer's service.
- G. The register shall be of the straight reading sealed magnetic drive type and shall contain six (6) numeral wheels. Registers must be roll sealed and dry. All direct reading register cups shall be copper to prevent corrosion and be covered with a high strength, impact resistant flat glass lens to prevent breakage. The lens shall be positioned above the register box to allow for run off of debris. The register lid shall overlap the register box to protect the lens. The register retaining ring shall be designed to absorb impact from the register. Register boxes and lids shall be of high-strength synthetic polymer or approved equivalent.
- H. Each meter must be accompanied by a factory test tag certifying the accuracy at the flows required by AWWA C700.
- I. Meters and meter parts shall be manufactured, assemble, an tested within the United States. Manufacturers may be required to provide proof of where and of what percentage of the meter register, chamber, and maincase is manufactured in the United States. Manufacturers shall have a minimum of fifteen years of field and production experience with all sizes and models. Manufacturers shall provide only one model of meter which complies with these specifications.
- J. All meters shall be guaranteed for one year on material and workmanship. Registers shall be guaranteed for 10 years.

- K. Water meter shall be model T-10 manufactured by Neptune Technology Group, Inc. only.
- L. Meter Boxes: Meter boxes shall be cast iron painted black with a locking lid quad valve box. Meter boxes shall have nominal dimensions of 14-3/4 inches x 17 inches at bottom, 12 inches x 14 inches opening, and 12 inches tall. Meter box assemblies shall include one U-branch, four ball valves, two unions, two touch plugs with cotter pins, and two expansion connections. The entire assembly shall be configured to allow 7-1/2 inch meter and an ASSE 1024 dual check valve with a combined distance of 12-3/4 inches between inlet and outlet unions for the installation of the meter and ASSE 1024 dual check valve backflow preventer.

2.09 Valve Boxes (VB) and Extensions Stems

- A. All valve boxes shall be equipped with valve boxes. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. The valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron extensions shall be provided as necessary. Covers shall have "WATER VALVE" or "WATER" cast into them. Valve boxes shall be manufactured in the United States.
- B. All valves shall be furnished with extension stems if operating nut is greater than four feet deep, to bring the operating nut to within 24-inches of the top of the valve box. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut. The coupling and square wrench nut shall be welded to the extension stem. Extension stems shall be equal to Mueller A-26441 or M & H Valve Style 3801.

2.10 Valve Markers (VM)

- A. The Contractor shall provide a concrete valve marker as detailed on the Drawings for each valve installed, except on hydrant isolation valves. Valve markers shall be stamped "V".

2.11 Tapping Sleeves and Valves (TS&V)

- A. Tapping sleeves for mains 12-inches in diameter and smaller shall be ductile iron of the split sleeve, mechanical joint type meeting the requirements of ASTM A536. Tapping sleeves shall be equal to Mueller H-615.
- B. Tapping sleeves for mains larger than 12-inches shall be of all stainless steel construction.
- C. The Contractor shall be responsible for determining the outside diameter of the pipe to be connected to prior to ordering the sleeve. The tapping sleeve shall be rated for 250 psi.
- D. Valves shall be gate valves furnished in accordance with the specifications shown above, with flanged connection to the tapping sleeve and mechanical joint connection to the branch pipe. The tapping sleeve shall be supplied by the valve manufacturer.

- E. All sleeves are to include the end joint accessories and split glands necessary to assemble sleeve to pipe. No special tools shall be required other than a standard socket wrench. Sleeves shall be coated with asphaltic varnish in compliance with NSF-61.
- F. After installation, tie rods and clamp assembly shall be cleaned thoroughly, covered with Royston Laboratories, Inc. Roskote Mastic No. A393 or Koppers Co. Inc. butumastic Superservice Black or approved equivalent.

2.12 Corporation Cocks and Curb Stops

- A. Corporation cocks and curb stops shall be ball type, shall be made of bronze conforming to ASTM B 61 or B 62, and shall be suitable for the working pressure of the system. Ends shall be suitable for flared tube joint. Threaded ends for inlet and outlet of corporation cocks shall conform to AWWA C800; coupling nut for connection to flared copper tubing shall conform to ANSI B16.26. Corporation cocks and curb stops shall be manufactured by Mueller or Ford FB-600.

2.13 Air Valves

- A. Construction and Design
 - 1. The air release and vacuum break valve shall be of the compact single chamber design with solid cylindrical HDPE control floats housed in a tubular stainless steel body with epoxy powder coated cast iron or steel ends secured by means of stainless steel tie rods.
 - 2. The valve shall have an integral "anti-shock" orifice mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure to two times valve rated working pressure.
 - 3. The intake orifice area shall be equal to the nominal size of the valve.
 - 4. Large orifice sealing shall be effected by the flat face of the control float seating against a nitrile rubber O-ring housed in a dovetail groove circumferentially surrounding the orifice.
 - 5. Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice nozzle on a natural rubber seal affixed into the control float. The nozzle shall have a flat seating land surrounding the orifice so that the damage to the rubber seal is prevented.
 - 6. The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.
 - 7. The valve design shall incorporate an over pressure safety feature that will fail without an explosive effect, such as is normally the case when highly compressed air is released suddenly. The feature shall consist of replaceable components such as gaskets or seals.
 - 8. Connection to the valve inlet shall be facilitated by a flanged end conforming to ANSI B16.1 Class 125. Flanged ends shall be supplied with the requisite number of stainless steel or mild steel screwed studs inserted for alignment to the specific standard.

9. Provide a 1/4-inch NPT test/bleed cock.
- B. Air valve shall be Vent-O-Mat, Series RBX1631.

2.14 Blow off Valves

Blow off valve shall be an assembly of tee and reducer leading to a vertical stand pipe section. The vertical pipe section can be connected to a fire hydrant or provided with a 2-inch square nut with threads to accept a standard hose. If there is no fire hydrant, the vertical pipe shall end at 12-inches below ground surface- as shown on details. All fittings and joints shall be standard ductile iron pipe with mechanical restrained joints.

2.15 Precast Concrete Products

- A. Provide precast concrete products in accordance with the following:
 1. Precast Concrete Sections
 - a. Precast concrete sections shall meet the requirements of ASTM C 478 for round shaped and ASTM C 913 for rectangular shaped precast concrete products. The minimum compressive strength of the concrete in precast sections shall be 4,000 psi. The minimum wall thickness shall be one twelfth of the inside diameter of the base, riser or the largest cone diameter.
 - b. Transition slabs which convert bases larger than four feet in diameter to four foot diameter risers shall be designed by the precast concrete manufacturer to carry the live and dead loads exerted on the slab.
 - c. Seal joints between precast sections by means of rubber O ring gaskets or flexible butyl rubber sealant. Butyl rubber sealants shall meet the requirements of AASHTO M 198. Sealant shall be pre formed type with a minimum nominal diameter of 1 inch.
 - d. Butyl rubber sealant shall be equal to Kent Seal No. 2 or Concrete Sealants CS 202.
 2. Catch Basins
 - a. Where shown on drawings or as required, existing catch basins shall be replaced with a like kind catch basin (inlet). All new and replaced catch basins shall be constructed of reinforced precast concrete, four foot (4') diameter or larger.
 - b. All catch basins shall be designed and constructed in compliance with Georgia D.O.T. specifications and shall be Georgia DOT 1033D or 1034D standard and shall require a reinforced precast "round to square adapter for additional throat support.
 - d. All precast concrete sections shall be manufactured, tested and marked in accordance with the latest provisions of ASTM C478. All structures shall have the minimum compressive strength of 4000 psi.

- e. Joints of the sections shall be of the tongue and groove type. Sections shall be joined using O-ring rubber gaskets conforming to the applicable provisions of ASTM C 443, latest revision, or filled with an approved preformed plastic gasket meeting the requirements of Federal Specifications SS-S-00210, "Sealing Compound, Preformed Plastic for Pipe Joints", Type 1, Rope Form.
 - f. In certain cases where rolled or "Hollywood" curb is utilized, the County Engineer (or field Inspector) may require the use of 1033F or 1034F catch basins.
 - g. Frames, covers and gratings shall be ductile iron designed for heavy-duty traffic services, ASTM A534, Grade 60-40-18, 24inch clear inside diameter with lettering "Storm Sewer" cast into cover. For structures, more than 5 feet deep, provide steps at 12-inch intervals. Steps shall be manufactured from deformed, ½ inch steel reinforcement rod (CASTM A 615) and encased in polypropylene complying with ASTM D 4101. Steps shall have pattern designed to prevent lateral slippage off step.
3. Brick and Mortar: Brick shall be whole and hardburned, conforming to ASTM C 32, Grade MS. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C 150. Sand shall meet ASTM C 144.
4. Iron Castings
- a. Cast iron manhole frames, and covers shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking. All castings shall be thoroughly cleaned in the shop and given two coats of approved bituminous paint before rusting begins.
 - b. Manhole frames and covers shall be bolt down type with design weight of 450 pounds, manufactured by Neenah, Vulcan or approved equal.
 - c. All frames and covers shall have machined horizontal bearing surfaces.
 - d. Bolt down covers shall be equipped with four 1/2 inch stainless steel bolts and a 1/8 inch red rubber or rubber O ring gasket. Covers shall be rotatable and interchangeable. Bolt holes shall be bored through so that debris entering the bolt hole will fall into the manhole. Bolt holes shall have the full 360 degree circle within the cover's radius when bored through the cover.
5. Plastic Steps: Manhole steps of polypropylene, molded around a steel rod, equal to products of M.A. Industries may be used.

6. Floor Door
 - a. Door shall be single or double leaf type as shown on the Drawings.
 - b. The frame shall be 1/4 inch extruded aluminum alloy 6063 T6, with built in neoprene cushion and with strap anchors bolted to the exterior. Door leaf shall be 1/4 inch aluminum diamond plate, alloy 6061 T6, reinforced with aluminum stiffeners as required. Stainless steel hinges shall be bolted to the underside and pivot on torsion bars that counterbalance the door for easy operation. The door shall open to 90 degrees and lock automatically in that position. A vinyl grip handle shall be provided to release the cover for closing. The door shall be built to withstand a live load of 300 pounds per square foot, and shall be equipped with a snap lock and removable handle. Bituminous coating shall be applied to exterior of frame by the manufacturer. The door shall also be provided with a hasp in addition to the built in locking mechanism.
 - c. The floor door shall be manufactured by The Bilco Company or Thompson Fabricating Company.
7. Vents
 - a. Where vent pipes are shown on the Drawings, vents shall be of one piece, welded steel construction. Vent pipes shall equal air valve size, but no less than 4 inches. The vent pipe shall be grouted into a precast hole in the vault. The discharge of the vent pipe shall be provided with a 3/16 inch PVC coated mesh screen.
 - b. Where vent pipes are not shown on the Drawings, the frame and cover or floor door shall be provided with 1 inch holes to provide equivalent opening as in air valve, but not less than two. The quantity for each valve size is as follows: 2 inch, 4; 3 inch, 9; 4 inch, 16; 6 inch, 36; 8 inch, 64.

2.16 Concrete

- A. Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. For job mixed concrete, submit the concrete mix design for approval by the Engineer. Ready mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

Part 3 Execution

3.01 Existing Utilities and Obstructions

- A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the County. The Contractor shall call the Utilities Protection Center (UPC) (800 282 7411) as required by Georgia Law (O.C.G.A. Sections 25 9 1 through 25 9 13) and shall call all utilities, agencies or

departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.

B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.

1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.
2. Expose the facility, for a distance of at least 200 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Engineer an updated copy of the log bi weekly, or more frequently if required.

C. Conflict with Existing Utilities

1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tying back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right of way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.
2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge to edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right of way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18 inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18 inches.
2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6 inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.
3. No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

3.02 Construction Along Highways and Roadways

- A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the Georgia Department of Transportation and City of Roswell with reference to construction operations, safety, traffic control, road maintenance and repair.
- B. Traffic Control
 1. The Contractor shall provide erect and maintain all necessary barricades, suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public. Flagmen shall be certified by a Georgia DOT approved training program.
 2. Construction traffic control devices and their installation shall be in accordance with the current Manual On Uniform Traffic Control Devices for Streets and Highways.
 3. Placement and removal of construction traffic control devices shall be coordinated with the Georgia Department of Transportation and Fulton County a minimum of 48 hours in advance of the activity.
 4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right of way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.
 5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary

locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.

6. Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.
7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Georgia Department of Transportation and City of Roswell. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual On Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

C. Construction Operations

1. Perform all work along highways, streets and roadways to minimize interference with traffic.
2. Stripping: Where the pipe line is laid along road right of way, strip and stockpile all sod, topsoil and other material suitable for right of way restoration.
3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.
4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.
5. Construction operations shall be limited to 400 feet along areas, including clean up and utility exploration.

D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.

E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.

F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right of way and

easement. The Contractor shall take extreme care in moving landscape features and promptly re establishing these features.

G. Maintaining Highways, Streets, Roadways and Driveways

1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work.
2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.
3. Furnish a road grader or front end loader for maintaining highways, streets, and roadways. The grader or front end loader shall be available at all times.
4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work.

3.03 Pipe Distribution

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. No pipe shall be strung further along the route than 400 feet beyond the area in which the Contractor is actually working without written permission from the County. The County reserves the right to reduce this distance to a maximum distance of 200 feet in residential and commercial areas based on the effects of the distribution to the adjacent property owners.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge to edge.

3.04 Location and Grade

- A. The Drawings show the alignment of the water main and the location of valves, hydrants and other appurtenances.
- B. Prior to clearing and grubbing, the Engineer will provide a temporary bench mark along the water main route and at all other locations where the alignment of the water main changes significantly.
- C. Construction Staking

1. The base lines for locating the principal components of the work are shown on the Drawings. Base lines shall be defined as the line to which the location of the water main is referenced, i.e., edge of pavement, road centerline, property line, right of way or survey line. The Contractor shall be responsible for performing all survey work required for constructing the water main, including the establishment of base lines and any detail surveys needed for construction. This work shall include the staking out of permanent and temporary easements to insure that the Contractor is not deviating from the designated easements.
 2. The level of detail of survey required shall be that which the correct location of the water main can be established for construction and verified by the Engineer. Where the location of components of the water main, e.g. tunnels and fittings, are not dimensioned, the establishment on the location of these components shall be based upon scaling these locations from the Drawings with relation to readily identifiable land marks, e.g., survey reference points, power poles, manholes, etc.
- D. Reference Points
1. The Contractor shall take all precautions necessary, which includes, but is not necessarily limited to, installing reference points, in order to protect and preserve the centerline or baseline established by the Engineer.
 2. Reference points shall be placed, at or no more than three feet, from the outside of the construction easement or right of way. The location of the reference points shall be recorded in a log with a copy provided to the Engineer for use, prior to verifying reference point locations. Distances between reference points and the manhole centerlines shall be accurately measured to 0.01 foot.
 3. The Contractor shall give the Engineer reasonable notice that reference points are set. The reference point locations must be verified by the Engineer prior to commencing clearing and grubbing operations.
- E. After the Contractor locates and marks the water main centerline or baseline, the Contractor shall perform clearing and grubbing.
- F. Construction shall begin at a connection location and proceed without interruption. Multiple construction sites shall not be permitted without written authorization from the Engineer for each site.
- G. The Contractor shall be responsible for any damage done to reference points, base lines, center lines and temporary bench marks, and shall be responsible for the cost of re establishment of reference points, base lines, center lines and temporary bench marks as a result of the operations.

3.05 Laying and Jointing Pipe and Accessories

- A. Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.
- B. Pipe Installation

1. Proper implements, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.
2. All pipes, fittings, valves, hydrants and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.
3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.
4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
6. It is not mandatory to lay pipe with the bells facing the direction in which work is progressing.
7. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be permitted.
8. Provide detection tape for all pipes up to 12-inches in diameter. A 2-inch wide detection tape shall be buried 4 to 10 inches deep. Should detection tape need to be installed deeper, the Contractor shall provide 3 inch wide tape. In no case shall detection tape be buried greater than 20 inches from the finish grade surface.
9. Electronic Markers (Locator Balls) are required on lines 16 inch and larger at intervals of 50 feet and on bends. Markers shall be EMS 1250 by 3M Telecom. Markers shall be buried at a depth between 3 feet and 5 feet. Where electronic markers are provided detection tapes are not required. The contractor shall also provide the owner a marker locator, subsite1-5 R and EML accessories. Costs of locator balls and installation are to be included in the unit price bid item.

C. Alignment and Gradient

1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than 3 degrees.
2. Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.

- D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push on, mechanical joint, restrained joint or as approved by the Engineer.
- E. Joint Assembly
1. Push on, mechanical, flange and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.
 2. The Contractor shall inspect each pipe joint within 1,000 feet on either side of main line valves to insure 100 percent seating of the pipe spigot, except as noted otherwise.
 3. Each restrained joint shall be inspected by the Contractor to ensure that it has been "homed" 100 percent.
 4. The Contractor shall internally inspect each pipe joint to insure proper assembly for pipe 24 inches in diameter and larger after the pipe has been brought to final alignment.
- F. Cutting Pipe: Cut ductile iron pipe using an abrasive wheel saw. Cut PVC pipe using a suitable saw; remove all burrs and smooth the end before jointing. The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push on or mechanical joint pipe shall be cut.
- G. Polyethylene Encasement: Installation shall be in accordance with AWWA C105 and the manufacturer's instructions. All ends shall be securely closed with tape and all damaged areas shall be completely repaired to the satisfaction of the Engineer.
- H. Valve and Fitting Installation
1. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Defective valves shall be corrected or held for inspection by the Engineer. Valves shall be closed before being installed.
 2. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12 inch and larger valves shall be provided with special support, such as treated timbers, crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.
 3. A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom

flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the Engineer.

4. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.
5. A valve marker shall be provided for each underground valve. Unless otherwise detailed on the Drawings or directed by the Engineer, valve markers shall be installed 6 inches inside the right of way or easement, and buried to a depth of 30-inches.
6. A precast concrete vault shall be installed for 24-inch valves and larger.

I. Hydrant Installation

1. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the Engineer.
2. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pumper nozzle facing the roadway.
3. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 18 inches above the ground or as directed by the Engineer.
4. Hydrants shall be attached to the water main by the following method:
 - a. For mains 12 inches and smaller, the isolation valve shall be attached to the main by connecting the valve to the hydrant tee.
 - b. For mains 16 inches and larger, the isolation valve shall be attached to the main by providing an anchor coupling between the valve and welded outlet or tee.
 - c. The isolation valve shall be attached to the hydrant by providing an anchor coupling or hydrant connector pipe between the valve and hydrant, if the hydrant and valve are less than two feet apart. Otherwise, provide ductile iron pipe with retainer glands on the hydrant and valve.
5. When a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least 6 inches above the drain port opening in the hydrant to a distance of 12 inches around the elbow.

6. When a hydrant is set in clay or other impervious soil, a drainage pit 2 x 2 x 2 feet shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under and around the elbow of the hydrant and to a level of 6 inches above the drain port.
7. Hydrants shall be located as shown on the Drawings or as directed by the Engineer. Provide adequate resistance to avoid transmitting shock moment to the lower barrel and inlet connection. This shall be accomplished by pouring a concrete collar approximately 6 inches thick with a diameter of 24 inches at or near the ground line around the hydrant barrel.
8. All hydrants shall have silver color fluorescent markings at curb.

J. Air Valve Vaults

1. Construct the vault or manhole as detailed on the Drawings.
2. The frame and cover or floor door shall be cast into the top slab. The floor door drain shall be piped to vault exterior.
3. Manholes shall be constructed such that their walls are plumb.

3.06 Connections to Water Mains

- A. Make connections to existing pipe lines with tapping sleeves and valves, unless specifically shown otherwise on the Drawings.
- B. Location: Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the Engineer to confirm the nature of the connection to be made.
- C. Interruption of Services: Make connections to existing water mains only when system operations permit. Operate existing valves only with the specific authorization and direct supervision of the County.
- D. Tapping Sleeves
 1. Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.
 2. Prior to attaching sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.
 3. Before performing field machine cut, the watertightness of the sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. An air compressor shall be attached, which will induce a test pressure as specified in this Section. No leakage shall be permitted for a period of five minutes.
 4. After attaching the sleeve to an existing main, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with a one percent hypochlorite solution.

- E. Connections Using Solid Sleeves: Where connections are shown on the Drawings using solid sleeves, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line.
- F. Connections Using Couplings: Where connections are shown on the Drawings using couplings, the Contractor shall furnish materials and labor necessary to make the connection to the existing pipe line, including all necessary cutting, plugging and backfill.

3.07 Valve Box Adjustment

Immediately prior to the installing finish pavement, all valve boxes (both new and existing to remain in service) shall be adjusted to finished pavement grade. The Contractor shall also be responsible for adjusting valve boxes to finished grade outside paved areas.

3.08 Thrust Restraint

- A. Provide restraint at all points where hydraulic thrust may develop.
- B. Retainer Glands: Provide retainer glands where shown on the Drawings and. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.
- C. Harnessing
 - 1. Provide harness rods only where specifically shown on the Drawings or directed by the Engineer.
 - 2. Harness rods shall be manufactured in accordance with ASTM A 36 and shall have an allowable tensile stress of no less than 22,000 psi. Harness rods shall be hot dip galvanized or field coated with bitumastic before backfilling.
 - 3. Where possible, harness rods shall be installed through the mechanical joint bolt holes. Where it is not possible, provide 90 degree bend eye bolts.
 - 4. Eye bolts shall be of the same diameter as specified in AWWA C111 for that pipe size. The eye shall be welded closed. Where eye bolts are used in conjunction with harness rods, an appropriate size washer shall be utilized with a nut on each end of the harness rod. Eye bolts shall be of the same material and coating as the harness rods.
- D. Thrust Collars: Collars shall be constructed as shown on the Drawings. Concrete and reinforcing steel shall meet the requirements as specified in this Section. The welded on collar shall be designed to meet the minimum allowable load shown on the Drawings. The welded on collar shall be attached to the pipe by the pipe manufacturer.
- E. Concrete Blocking

1. Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.
2. Concrete shall be as specified in this Section.
3. Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the Engineer. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

3.09 Inspection and Testing

- A. All sections of the water main subject to internal pressure shall be pressure tested in accordance with AWWA C600 and these Specifications. A section of main will be considered ready for testing after completion of all thrust restraint and backfilling.
- B. Each segment of water main between main valves shall be tested individually.
- C. Test Preparation
 1. For water mains less than 24 inches in diameter, flush sections thoroughly at flow velocities, greater than 2.5 feet per second, adequate to remove debris from pipe and valve seats. For water mains 24 inches in diameter and larger, the main shall be carefully swept clean, and mopped if directed by the Engineer. Partially open valves to allow the water to flush the valve seat.
 2. Partially operate valves and hydrants to clean out seats.
 3. Provide temporary blocking, bulkheads, flanges and plugs as necessary, to assure all new pipes, valves and appurtenances will be pressure tested.
 4. Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Insert corporation cocks at highpoints to expel air as main is filled with water as necessary to supplement automatic air valves. Corporation stops shall be constructed as detailed on the Drawings with a meter box.
 5. Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure.
 6. The differential pressure across a valve or hydrant shall equal the maximum possible, but not exceed the rated working pressure. Where necessary, provide temporary backpressure to meet the differential pressure restrictions.
 7. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.
- D. Test Pressure: Test the pipeline at 250 psi measured at the lowest point for at least two hours. Maintain the test pressure within 5 psi of the specified test pressure for the test duration. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test

pressure. Provide an accurate pressure gage with graduation not greater than 5 psi.

E. Leakage

1. Leakage shall be defined as the sum of the quantity of water that must be pumped into the test section, to maintain pressure within 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.

2. The County assumes no responsibility for leakage occurring through existing valves.

F. Test Results: No test section shall be accepted if the leakage exceeds the limits determined by the following formula:

$$L = \frac{SD (P)^{1/2}}{133,200}$$

Where: L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

As determined under Section 4 of AWWA C600.

If the water main section being tested contains lengths of various pipe diameters, the allowable leakage shall be the sum of the computed leakage for each diameter. The leakage test shall be repeated until the test section is accepted. All visible leaks shall be repaired regardless of leakage test results.

G. Completion: After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

3.10 Disinfecting Pipeline

A. After successfully pressure testing each pipeline section, disinfect in accordance with AWWA C651 for the continuous feed method and these Specifications.

B. Specialty Contractor: Disinfection shall be performed by an approved specialty contractor. Thirty (30) days before disinfection is performed, the Contractor shall submit a written procedure for approval before being permitted to proceed with the disinfection. This plan shall also include the steps to be taken for the neutralization of the chlorinated water.

C. Chlorination

1. Apply chlorine solution to achieve a concentration of at least 25 milligrams per liter free chlorine in new line. Retain chlorinated water for 24 hours. Water shall be supplied from a temporary source protected by appropriate backflow prevention devices. Backflow preventer must be approved by the County prior to connection. Chlorine shall be injected no more than ten feet from the beginning of the new main.

2. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 24 hour period.
 3. After 24 hours, all samples of water shall contain at least 10 milligrams per liter free chlorine. Re chlorinate if required results are not obtained on all samples.
- D. Disposal of Chlorinated Water: Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual. Flush all lines until residual is equal to existing system.
- E. Bacteriological Testing: After final flushing and before the water main is placed in service, the Contractor shall collect samples from the line and have tested for bacteriological quality in accordance with the rules of the Georgia Department of Natural Resources, Environmental Protection Division. One set of samples shall be collected from every 1,200 feet of water main, plus one set from each end of main and one set from each branch. Testing shall be performed by the County's water laboratory. Re chlorinate lines until required results are obtained.

3.11 Protection and Restoration of Work Area

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
 2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
 4. The Department of Transportation's engineer shall be authorized to stop all work by the Contractor when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man Made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.

- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3 inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.
- F. Swamps and Other Wetlands
 - 1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures which alter the original topographic features within the easement.
 - 2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non native materials shall be disposed by the Contractor.
 - 3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between portions of a swamp, wetland or stream which may be temporarily divided by construction.
 - 4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.

3.12 Abandoning Existing Water Mains

- A. General: Abandon in place all existing water main segments indicated on the Drawings to be abandoned. Perform abandonment after the new water main has been placed in service and all water main services have been changed over to the new main. Salvage for the County, existing fire hydrants, valve boxes, valve markers, and other materials indicated on the Drawings or located on water mains abandoned.
- B. Capping and Plugging: Disconnect by sawing or cutting and removing a segment of existing pipe where cutting and capping or plugging is shown on the Drawings or directed by the Engineer. Provide a watertight pipe cap or plug and concrete blocking for restraint to seal off existing mains indicated to remain in service. Seal ends of existing mains to be abandoned with a pipe cap or plug or with a masonry plug and minimum 6 inch cover of concrete on all sides around

the end of the pipe. The Contractor shall be responsible for uncovering and verifying the size and material of the existing main to be capped or plugged.

- C. Salvaging Materials: Salvage existing fire hydrants, valve boxes, valve markers and other materials as indicated on the Drawings and deliver salvaged items in good condition to the County's storage yard. Coordinate delivery and placement of salvaged materials in advance with the County at the following address:

Department of Public Works
Water & Pollution Control Division
North Fulton Water System
11575-A Maxwell Road
Alpharetta, Georgia . 30004
Attn: Mr. Thomas Czeccil; Phone No.: 770-410-3421.

- D. Pavement Removal and Replacement: Perform any necessary pavement removal and replacement in accordance with the details on the Drawings and Section 02575 of these Specifications.

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END OF SECTION

Part 1 General**1.01 Scope**

- A. The work covered by this Section includes furnishing all materials and equipment, providing all required labor and installing water service connections and all appurtenant work according to these Specifications and/or to the Water Connection Detail as shown schematically on the Drawings.
- B. Water meters are not to be furnished nor installed. However, the water meter connection must be compatible with the water meters currently used by the County.
- C. No galvanized pipe or fittings shall be used on water services.

1.02 Locations

Locations shall be directed by the Engineer along the route of the water mains.

1.03 Service Compatibility

It is the intent of these Specifications that the water service connections shall duplicate those presently being provided by the County in order to be compatible with their service maintenance procedures.

1.04 Quality Control

All materials installed under this Section shall have the approval of the NSF for water services.

Part 2 Products**2.01 Materials and Construction**

- A. Service Line
 - 1. Copper Tubing: Tubing shall be ASTM B 88, Type K, rolled type. Fittings shall be brass with flare connection inlets and outlets, ANSI B16.26. Where required, adapters shall be brass. Unions shall be cast bronze. Joints shall be flare type. All fittings shall be of bronze construction with flare type connections.
- B. Meter Boxes
 - 1. Meter boxes shall be cast iron painted black with a locking lid quad valve box. Meter boxes shall have nominal dimensions of 14-3/4 inches x 17 inches at bottom, 12 inches x 14 inches opening, and 12 inches tall. Meter box assemblies shall include one U-branch, four ball valves, two unions, two touch plugs with cotter pins, and two expansion connections. The entire assembly shall be configured to allow 7-1/2 inch meter and an ASSE 1024 dual check valve with a combined distance of 12-3/4 inches between inlet and outlet unions for the installation of the meter and ASSE 1024 dual check valve backflow preventer. The County will install the meter for domestic use or irrigation use after property owner applies for it.

2. Meter boxes shall be equal to Ford Meter Box Company, Double Gulf Box Part #LDG12U-243FULTPNA (formerly Part #LDG12U-243-NA-TT).

C. Valves and Accessories

1. Ball valves shall be full port bronze, heavy duty type. Valve ends shall be threaded. Valves shall have a minimum 200 psi working pressure for water. Valves shall have stainless steel nut and handle. Valves shall be made in the U.S.A.
2. Corporation Cocks
 - a. Corporation cocks shall be ground key type, shall be made of bronze conforming to ASTM B61 or B62 and shall be suitable for the working pressure of the system. Ends shall be suitable for flare type joint. Coupling nut for connection to flared copper tubing shall conform to ANSI B16.26.
 - b. Corporation cocks shall be equal to Ford FB-600-4.

Part 3 Execution

3.01 General

- A. Immediately following completion of the water main system, the Contractor shall install water taps and meter boxes as required. All taps shall remain exposed at the main until the system has been successfully inspected, disinfected and tested for pressure.
- B. Installation shall conform to the details for water service connections appearing schematically on the Drawings. Contractor shall provide any and all appurtenant work required to provide the intended water service connections.
- C. The Contractor shall be prepared to make emergency repairs to the water system, if necessary, due to damage by others working in the area. In conjunction with this requirement, the Contractor shall furnish and have available at all times, a tapping machine, for the purpose of making temporary water service taps or emergency repairs to damaged water services. The Contractor shall furnish the County a phone number of an individual with the authority to initiate emergency repair work. This number must be provided prior to starting work on the Project.

3.02 Tapping Main

- A. All services connected to water main shall be through a 1-inch direct tap, regardless of service and meter size.
- B. The water main shall be tapped with a tapping machine specifically designed for that purpose. The tap shall be a direct tap into the water main through a 1-inch brass corporation cock. All taps shall be supervised by the Fulton County Department of Development Services. All taps shall be made on the water main at a position so as not to be the top side of the pipe nor the bottom of the pipe. Distance between taps must be a minimum of 12-inches apart.

3.03 Service Lines

- A. Copper tubing between tap and water meter shall be one continuous length of pipe with no intermediate joints or connections. The service line shall be placed without sharp turns or bends from the water main to the meter box.
- B. When meters are located on the opposite side of the street from the water main, new copper service lines shall be extended through a common 6-inch bore, Schedule 40 PVC conduit to the service side. Replacement of existing services may be by free bore without a casing.
- C. 1-1/2-inch water services (meter box installation only) are made by utilizing a branch connection (wye) and two 1-inch direct taps. 1-inch copper tubing lines are joined at the branch connection at the meter box (meter box equal to CdR box 17 x 30 x 20 dimensions with water logo). Branch connections shall be equal to Ford Model #Y-28-246 with two 1-inch copper flare connections x 1-1/2-inch male iron pipe threads. A curb stop equal to Ford Model #B11-666W is threaded onto the 1-1/2-inch end of branch connection. Utilizing a 1-1/2-inch, 3-piece meter coupling equal to Ford Model #CF31-66 and meter coupling bushing Model #BIM-66 is threaded onto the opposite side of the curb stop.
- D. 2-inch water services (meter box installation only) are made by utilizing a branch connection and three 1-inch direct water taps. 1-inch copper tubing lines are joined at the branch connection at the meter box (meter box equal to CdR box 24 x 36 x 24 dimensions with water logo). Branch connections shall be equal to Ford Model #Y-28-347 with three 1-inch copper flare connections x 2-inch male iron pipe threads. A curb stop equal to Ford Model #B11-777W is threaded onto the 2-inch end of branch connection. Utilizing a 2-inch, 3-piece meter coupling equal to Ford Model #C38-77 with bushing Model #BIM-77 is threaded onto the opposite side of the curb stop.

3.04 Meter Boxes

- A. The meter box shall be located parallel to the curb and centered within the space two feet behind the back of the curb. The meter box lid shall be set at finished grade of the road shoulder. The meter box shall be placed on a bed of gravel or crushed stone. The bed shall be 3-inches thick and extend 6-inches in all directions beyond the edge of the meter box. The box shall be carefully and uniformly backfilled to prevent distortion that would cause leaks. Meter boxes shall be located in pairs within two feet of the common property lines between the lots.
- B. All water meters shall have fluorescent markings at curb. Markings shall not be the same color as markings denoting hydrants.
- C. An 8-inch long threaded brass nipple shall be provided between the meter and a ball valve on the residence side of the meter box. The ball valve shall be located in an 8-inch diameter fiberglass valve box with lid. The valve box shall be placed on a blanket of granular crushed stone. The bed shall be 3-inches thick and extend 3-inches in all directions beyond the edge of the valve box.

3.05 Relocation of Service Lines

- A. Existing service lines shall be field located by the Contractor. The Contractor shall be responsible for locating existing water meters, relocating the meters and meter boxes as necessary, and determining the existing size service line to

reconnect the meters to the new water mains. All service lines installed under existing pavement, including streets, driveways and sidewalks, shall be installed by boring.

3.06 Transfer of Service

- A. Immediately before connecting to the relocated or existing meter, all service lines shall be flushed to remove any foreign matter. Any special fittings required to reconnect the existing meter to the new copper service line, or the existing private service line, shall be provided by the Contractor. To minimize out of service time, the Contractor shall determine the connections to be made and have all the required pipe and fittings on hand before shutting off the existing service. After completing the connection, the new corporation stop shall be opened and all visible leaks shall be repaired.

3.07 Maintenance and Repairs

- A. The tap, service line and meter box shall remain under the Contractor's maintenance responsibility for the same warranty period as the water main. The contractor shall promptly repair any damage to the water system during the warranty period.

(Remainder of this page intentionally left blank.)

END OF SECTION

Part 1 General**1.01 Scope**

- A. The Contractor shall furnish all labor, materials, equipment and miscellaneous items as necessary for the installation of a complete chain link fence system. Fencing shall be installed in the location as shown on the Drawings in complete conformity with the manufacturer's written recommendations and as specified herein.
- B. Security fencing for the Contractor is at Contractor's option and is not included as part of the work specified.

1.02 Submittals

Product data shall be submitted in complete conformance with the requirements of Section 01340 of these Specifications.

1.03 Delivery and Handling

- A. Deliver materials with the manufacturer's tags and labels intact.
- B. Handle and store materials in such a manner that will avoid damage.

1.04 Storage and Protection

Provide storage and protection in accordance with the requirements of Section 01640 of these Specifications.

1.05 Quality Assurance

- A. Standards of manufacturer shall comply with the standards of the Chain Link Manufacturers Institute and these Specifications.
- B. Provide fencing as a complete unit produced by a single manufacturer including the required erection accessories, fittings and fasteners.

Part 2 Products**2.01 General**

- A. Overall height for new fencing shall be six feet including three strands of barbed wire on malleable iron post tops. Posts shall be set at no more than 10 foot centers, a full three feet deep in concrete footings, poured the full size of the holes as excavated. Corner posts shall have the necessary strut and tie bracing. Gates shall be provided of the size and at the locations indicated on the Drawings.
- B. Where fencing crosses ditches, steep grades, and other unusual conditions, make special provisions to insure that the security, appearance, maintainability and permanence of the standard fencing are equalled or exceeded.

2.02 Materials and Construction

- A. Fence Mesh: 9 gauge wire, woven to 2 inch squares, galvanized after weaving, six foot wide roll. Continuous tension wire shall be provided at the lower edge of the mesh.

- B. Line Post: 2 1/2 inch O.D. Galvanized Pipe (3.65 lb.).
- C. Corner Post: 3 inch O.D. Galvanized Pipe (5.79 lb.).
- D. Gate Post: 4 inch O.D. Galvanized Pipe (9.11 lb.).
- E. Top Rail: 1 5/8 inch O.D. Galvanized Pipe (2.27 lb.) with extra long pressed steel sleeves.
- F. Gates shall be supplied with heavy duty latches, keepers and heavy duty hardened bronze padlocks with duplicate keys.
- G. Gate Frames: 2 inch O.D. Galvanized Pipe Frame (2.72 lb.).
- H. Barbed wire shall consist of three strands of 12 gauge wire, with 4 point pattern barbs, galvanized after weaving.
- I. Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 3000 psi.

Part 3 Execution

3.01 Installation

- A. Fence installation shall not be started before the final grading is completed, with finish grade elevations established, unless otherwise permitted.
- B. Excavation: Drill holes of diameters and spacings shown, for post footings in firm, undisturbed or compacted soil.
 - 1. If not shown on the Drawings, excavate holes to the minimum diameters as recommended by fence manufacturer.
 - 2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than the post bottom, with bottom of posts set not less than 36 inches below the surface when in firm, undisturbed soil.
 - 3. If solid rock is encountered near the surface, drill into rock at least 12 inches for line posts and at least 18 inches for end, pull corner, and gate posts. Drill hole at least 1 inch greater diameter than the largest dimension for the post to be placed. If solid rock is below soil overburden, drill to full depth required. Penetration into rock need not exceed the minimum depths specified above.
- C. Setting Posts: Remove loose and foreign materials from sides and bottoms of holes and moisten soil prior to placing concrete.
 - 1. Center and align posts in holes 3 inches above bottom of excavation.
 - 2. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
 - 3. Trowel finish tops of footings and slope of dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.

4. Keep exposed concrete surfaces moist for at least seven days after placement or cure with membrane curing materials or other acceptable curing methods.
 5. Grout in posts set into sleeved holes, concrete constructions or rock excavations with non shrink Portland cement grout or other acceptable grouting material.
- D. Concrete Strength: Allow concrete to attain at least 75 percent of its minimum 28 day compressive strength, but in no case sooner than seven days after placement, before rails, tension wires, barbed wire or fabric is installed. Do not stretch and tension fabric and wires and do not hang gates until the concrete has attained its full design strength.
- E. Top Rails: Run rail continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.
- F. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
- G. Tension Wire: Install tension wires by weaving through the fabric and tying to each post with not less than 6 gauge galvanized wire or by securing the wire to the fabric.
- H. Fabric: Pull fabric taut and tie to posts, rails and tension wires. Install fabric on security side of fence and anchor to framework so that fabric remains in tension after pulling force is released.
- I. Repair damaged coatings in the shop or during field erection by recoating with manufacturer's recommended repair compound, applied per manufacturer's directions.
- J. Stretcher Bars: Thread through or clamp to fabric 4 inches on center and secure to posts with metal bands spaced 15 inches on center.
- K. Barbed Wire: Install three parallel wires on each extension arm; on security side of fence, unless otherwise indicated. Pull wire taut and fasten securely to each extension arm.
- L. Tie Wires: Use U shaped wire appropriate for the diameter of pipe. Attach pipe and fabric firmly with tie wire ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing.
- M. Fasteners: Install nuts for tension band and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.02**Cleaning**

Perform cleaning during installation of the work and upon completion of the work. Remove from site all debris and equipment. Repair all damage resulting from chain link fence system installation. Cleaning shall be in accordance with the requirements of Section 01710 of these Specifications.

(Remainder of this page intentionally left blank.)

END OF SECTION

Part 1 General**1.01 Scope**

This Section includes furnishing all equipment, materials and labor necessary for soil preparation, planting of trees, shrubs, ground cover or vines as applicable, protection, maintenance, warranty and replacement of plants and all related items as shown on the Drawings and specified herein.

1.02 Subsurface Investigation

Before commencing any work required by this Section, the Contractor shall ascertain the location of all utilities, subsurface drainage and underground construction so that proper precautions may be taken not to disturb or damage any subsurface improvements. The Contractor will be held responsible for making, at Contractor's expense, all repairs to damaged utilities and structures resulting from the work.

1.03 Obstructions Below Ground or Overhead

- A. It is not contemplated that planting shall occur where the depth of soil over underground construction or obstructions is insufficient to accommodate the roots or where impervious soil will require drainage. Where such conditions are encountered in excavation of planting areas, other locations for underground construction or for the planting may be designated by the Engineer.
- B. Removal of underground obstructions, relocation of construction and provision of drainage for planting areas shall be done only as directed by the Engineer.
- C. If changes in the location of the work or if removal of obstructions involve additional work, the Contractor shall proceed in accordance with the General Conditions of the Contract Documents.

1.04 Qualifications

All planting shall be performed by personnel familiar with planting procedure and under the supervision of a qualified planting foreman.

1.05 Existing Improvements

The Contractor shall take all necessary precautions to avoid damage to existing sidewalks, fencing, paving, curbs, lighting and other site improvements.

1.06 Quality Assurance

- A. Size, quality, root ball preparation and grading standards shall conform to the American Association of Nurserymen, Inc., as published in the "American Standard for Nursery Stock" ANSI 260.1, latest approved revision.
- B. The Contractor shall obtain representative samples of topsoil to be used in planting operations and shall furnish soil analysis certificates to the Engineer for approval. Tests shall be performed by the State University Agricultural Extension Service or an approved independent testing laboratory; tests shall include pH, texture and organic matter analysis. One soil test per 100 cubic yards of topsoil is required.

- C. The Contractor shall be responsible for all certificates of inspection of plant materials that may be required by federal, state or other authorities to accompany shipments of plants. All plants must be inspected and approved by the Engineer before they are planted. Inspection and approval of plants upon delivery shall be for quality, size and variety only and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the Work.
- D. Fertilizer shall conform to the local, state and federal laws applicable to its manufacture and labeling.

1.07 Warranty

- A. Warranty: Plants shall be alive, healthy and vigorous at the end of the warranty period. The warranty period shall terminate at the end of the first full growing season. The first full growing season begins on April 1 after planting and ends on November 1.
- B. Replacement: The Contractor shall inspect all planting monthly until the end of the maintenance period, and shall submit to the Engineer a written report describing plant replacements, if any. Any plant required under this Contract that is dead or not in satisfactory growth will be removed from the site; these and any plants missing due to the Contractor's negligence shall be replaced as soon as conditions permit. In case of any question regarding the condition and satisfactory establishment of a rejected plant, the Contractor shall notify the Engineer immediately in writing, and the Engineer shall determine acceptability. All replacement plants shall be warranted for the duration of one full growing season as described in paragraph A. above.

Part 2 Products

2.01 Topsoil

The Contractor shall furnish, at no additional cost to the Owner, all necessary topsoil for the planting of trees, shrubs, vines, and/or ground covers. All topsoil shall be natural soil classifiable as a loam, silt loam or sandy loam as described in the U.S. Department of Agriculture triangular soil texture chart. The acidity range, between 5.5 and 6.0 pH, shall contain not less than two percent organic matter as determined by the Wakley-Black Method as described in Soil Chemical Analysis, 1958, Prentice-Hall, Inc. Topsoil shall be free from hard clods, stiff clay, hardpan, stones larger than 1 inch in diameter, noxious weeds and plants, sod, partially disintegrated debris, insects or any other undesirable material that would be toxic or harmful to growth. Topsoil for planting may be conditioned by the use of approved additives until the requirements outlined in the paragraph are satisfied.

2.02 Peat

Peat shall be commercial Sphagnum peat moss containing not more than 15 percent moisture and not less than 60 percent decomposed organic matter by weight calculated on an oven dried basis. It shall be clean, free from stones, sticks, roots and other foreign matter and shall be shredded. It shall be delivered to site in unopened, partially compressed bales.

2.03 Sand

Sand for planting mix shall be clean, natural sand meeting the requirements of ASTM C 144. Sand may be prepared from stone, gravel or other inert material having similar characteristics subject to approval by the Engineer.

2.04 Manure

Manure shall be commercially composted horse or cow manure subject to approval by the Engineer.

2.05 Limestone

Limestone, if necessary as a soil additive shall be ground agricultural dolomitic limestone containing no less than 85 percent of total carbonates and shall be ground to such fineness that 90 percent of the material will pass through a No. 10 mesh screen, 50 percent will pass through a No. 50 mesh screen, and not less than 25 percent will pass through a No. 100 mesh screen.

2.06 Planting Mix

- A. All planting pits shall be backfilled with a planting mix consisting of the following proportions by volume:
 - 1. One part native soil.
 - 2. One part peat.
 - 3. One part sand.
- B. The planting mix shall be thoroughly mixed prior to final placement. If so directed by the Engineer, ground limestone shall be added to the mix at a rate of 2 1/2 pounds per cubic yard for each full point rise in pH desired.

2.07 Plants

- A. The names of plants required under this Contract conform to those given in "Standardized Plant Names," latest edition, prepared by the American Joint Committee on Horticultural Nomenclature.
- B. Plant specimens shall conform to those indicated on the Drawings.
- C. Plants shall be nursery grown and have a habit of growth that is normal for the species. They shall be sound, healthy, vigorous and free from insect pests, plant diseases and injuries. All plants shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning with branches in normal position. No pruning shall be done until the plants have been inspected by the Engineer and in no case shall the plants supplied under this Contract be pruned back to such an extent that they no longer meet Specifications. Root bound container plants shall have their root balls scarified 1/2 inch deep along their length on two sides to cut the circling roots.
- D. Substitutions of genus, species or variety will be permitted only upon submission of proof, in writing, that the specified plant or its alternative is not obtainable in

the continental United States. Written authorization for substitution must be obtained from the Engineer.

- E. Under special conditions plants may be field collected if approved in writing by the Engineer.
- F. All plants (except ground covers) in the Plant List shall be balled and burlapped or container grown unless noted otherwise. Balled and burlapped material shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be firmly wrapped with burlap and bound with twine, cord or wire mesh. Where necessary to prevent breaking or cracking of the ball during the process of planting, the ball may be secured to a platform.

2.08 Miscellaneous Materials

- A. Water shall be suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.
- B. Mulch, if applicable, shall be pure grade pulverized pine bark or pine straw.
- C. Fertilizer shall be slow release, resin coated fertilizer having a chemical analysis of 19 6 12, equal to Osmocote.
- D. Materials for Staking, Guying and Wrapping
 - 1. Stakes for supporting trees shall be as shown on the Drawings. Stakes shall be rot resistant wood, e.g., redwood, oak, western cedar or pressure treated southern pine.
 - 2. Wire for fastening trees to stakes or eye bolts shall be No. 12 gauge pliable, galvanized steel.
 - 3. Hose to encase guy wires or wires used for fastening shall be rubber garden hose.
 - 4. Wrapping material for deciduous tree trunks shall be treated heavy crepe paper or burlap in strips 6 to 10 inches wide.
 - 5. Turnbuckles shall have a 3 inch minimum lengthwise opening fitted with threaded ends and screw eyes. All parts shall be hot dipped galvanized steel or some other rust resistant material.
 - 6. If required on Drawings, metal or plastic flags shall be minimum 3 x 5 inches x 1/8 inch thick attached by running wire through punched holes on both ends. Position at waist height on each wire.

Part 3 Execution

3.01 Time of Planting

- A. The Contractor shall be notified in writing by the Engineer when other sections of the Work have progressed sufficiently to commence work of planting. Planting operations shall be conducted immediately under favorable weather conditions. These seasons shall be as follows:

1. Planting Season: Plant all trees, shrubs and ground covers between October 1 and April 1.
2. At the option and the full responsibility of the Contractor, planting operations may be conducted under unseasonable conditions without additional compensation.

3.02 Product Handling and Storage

- A. Balled and burlapped plants shall be dug and prepared for shipment in a manner that will not damage roots or branches.
- B. Protection After Delivery: The balls or roots of plants not planted immediately on delivery shall be covered with moist soil or mulch, or other protection from drying winds and sun. All plants shall be watered as necessary, until planted. Balled plants shall not be lifted by the trunk of the plant.

3.03 Planting of Trees, Shrubs and Ground Cover

- A. Except as otherwise specified, the Contractor's work shall conform to accepted horticultural practices as used in the trade.
- B. The Engineer shall verify the staking of all plants with labeled stakes to be furnished for this purpose by the Contractor.
- C. Planting pits shall be dug and soil for planting ready before plants are delivered. Pits shall be excavated according to the dimensions indicated on the Drawings.
- D. Ground cover beds, if applicable, shall be prepared by thorough loosening of existing sub grade and by placement of a minimum of 4 inches of approved topsoil to conform to the final grade.
- E. Excess excavated soil from planting operations shall be disposed of by the Contractor.
- F. All plants shall be set on prepared soil to such depth that the finished grade level at the plant after settlement will be the same as that at which the plant has grown. They shall be planted upright and plumb. No burlap shall be pulled out from under balls. Platforms, wire and burlap for top and sides of the ball shall be removed. All broken or frayed roots shall be cut off cleanly. Topsoil or prepared soil shall be placed and compacted carefully to avoid injury to roots and to fill voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the hole to finish grade. After the ground settles, additional soil shall be filled to the level of the finished grade.
- G. During the setting of plants, 20 10 5 slow release fertilizer tablets shall be positioned approximately halfway up the root system, evenly distributed around and adjacent to the root ball. The following shall apply:
 1. Small Ground Cover Plants: One 5 gram tablet per plant.
 2. Shrubs: Two 10 gram tablets for each one foot of height or spread.
 3. Trees: Two 21 gram tablets for each 1/2 inch of trunk diameter.

- H. If applicable, staking and guying shall be accomplished as shown on Drawings. Supports shall be kept in place during entire warranty period.
- I. Promptly after planting, trunks of all deciduous trees shall be wrapped spirally from the ground line to the height of the second branches. All wrapping shall be neat and snug and the material shall be held in place by brown unpolished jute twine.
- J. Unless shown otherwise on the Drawings, all plants shall be mulched with a 4 inch layer of pine straw within two days after planting. This mulch shall entirely cover the area of the planting pit, bed or saucer around each plant.
- K. If applicable, plant beds containing ericaceous plants shall be top dressed with ordinary powered sulfur at the rate of three pints per 100 square feet of area.

3.04 Pruning and Repair

Upon completion of the Work under the Contract, all new trees and shrubs shall have been pruned and any injuries repaired. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant. All cuts shall be made at the branch collar. Flush cutting of branches shall be grounds for rejecting the tree. The Contractor shall remove the tree from the site and substitute another of the same species and quality. Errors in pruning resulting in tree replacement shall not entitle the Contractor to additional compensation. On all bruises or scars on the bark and cuts over 3/4 inch in diameter, the injured cambium shall be traced back to living tissue and removed; wounds shall be smoothed and shaped so as not to retain water.

3.05 Tree Removal and Disposal

As shown on drawings, contractor shall remove trees to the ground level. Excavate and cut roots to 24 inches below ground and remove all roots, including and up to drip line, to prevent future sprouting. Contractor shall remove all branches, tree limbs leaves and roots away from the site to an approved disposal facility.

Fill the excavated hole with select backfill material and compact to 90% proctor density. Finish the ground surface with permanent vegetation (grass) to match with the adjacent ground cover.

3.06 Inspection for Acceptance

Upon completion of all planting and after written notification, inspection of the landscape work to determine partial completion of the contract work, exclusive of maintenance and replacement of plants, will be made by the Engineer. Inspection of the work will be made again by the Engineer at the end of the maintenance period.

3.07 Maintenance

Maintenance shall begin immediately after each plant is planted and shall continue until all plants are accepted. Planting shall be protected and maintained by watering, fertilizing and replanting as necessary for at least one full growing season beginning April 1 and ending November 1.

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END OF SECTION

Part 1 General**1.01 References**

- A. American Concrete Institute (ACI):
 - 1. 301-89, Specification for Structural Concrete for Buildings.
 - 2. 305R-89, Hot Weather Concreting.
 - 3. 306R-88, Cold Weather Concreting.
 - 4. 318/318R-89, Building Code Requirements for Reinforced Concrete.
 - 5. 347-89, Formwork for Concrete.
- B. American Society for Testing and Materials (ASTM):
 - 1. A497-90b, Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 2. A615-90, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. C31-90a, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 4. C39-86, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 5. C94-90, Standard Specification for Ready-Mixed Concrete.
 - 6. C150-89, Standard Specification for Portland Cement.
 - 7. C260-86, Standard Specification for Air-Entraining Admixtures for Concrete.
 - 8. C309-89e, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 9. C494-90, Standard Specification for Chemical Admixtures for Concrete.
 - 10. C618-91, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
 - 11. D994-71e, Standard Specification for Preformed Expansion Joint filler for Concrete (Bituminous Type) (R 1982).
- C. Concrete Reinforcing Steel Institute (CRSI):
 - 1. Manual of Standard Practice, 1990, 25th Edition.
 - 2. Recommended Practice for Placing Reinforcing Bars.

1.02 Submittals

- A. Shop Drawings:
 - 1. Reinforcing steel in accordance with CRSI 1990 Manual of Standard Practice and ACI SP-66.
 - 2. Curing compound data.
 - 3. Complete data on the concrete mix, including aggregate graduations and admixtures, in accordance with ASTM C94-90.
- B. Quality Control Submittals:
 - 1. Manufacturer's application instructions for curing compound.
 - 2. Ready-mix delivery tickets for each truck in accordance with ASTM C94-90.

1.03 Quality Assurance

- A. Formwork: Unless otherwise specified, follow the recommendations of ACI 347-89.
- B. Concrete and Reinforcement: Unless otherwise specified, meet the requirements of ACI 301-89 and 318/318R-89.
- C. Hot weather Concreting: Conform to ACI 305R-89.
- D. Cold Weather Concreting: Conform to ACI 306R-88.

1.04 Environmental Requirements

- A. Do not place Concrete when the ambient temperature is below 40 degrees F or approaching 40 degrees F and air temperatures less than 40 degrees F for the first 7 days, without special protection to keep Concrete above 40 degrees F.
- B. Do not use curing compound where solvents in the curing compounds are prohibited by state or federal air quality laws. Use only water curing methods.

Part 2 Products**2.01 Concrete**

- A. Ready-mixed meeting ASTM C94-90, Option A.
- B. Portland Cement: ASTM C150-89, Type I or Type II
- C. Admixtures:
 - 1. Air-Entraining: ASTM C260-86.
 - 2. Water-Reducing: ASTM C494-90, Type A or D.
 - 3. Superplasticizers: ASTM C494-90, Type F or G.

4. Fly Ash: ASTM C618-91, Class C or F.
 5. Color Pigments: Inert mineral or metaloxide pigments, natural or synthetic; resistant to lime and other alkalies.
- D. Mix Design:
1. Minimum Allowable 28-Day Compressive Field Strength: 4,000 psi when cured and tested in accordance with ASTM C31-90a and C39-86.
 2. Coarse Aggregate Size: 3/4 inches and smaller.
 3. Slump Range: 3 to 5 inches.
 4. Air Entrainment: Between 3 and 6 percent by volume.
 5. Water Reducers: Use in concrete without plasticizer.
- E. Mixing: Minimum 70 and maximum 270 revolutions of mixing drum. Non-agitating equipment is not allowed.

2.02 Reinforcing Steel

- A. Deformed Bars: ASTM A 615-90, Grade 60.
- B. Welded Wire Fabric: ASTM A497-90b.

2.03 Ancillary Materials

- A. Expansion Joint Filler: ASTM D994-71e, 1/2-inch thick, or as shown.
- B. Nonshrink Grout:
1. Color: To match concrete.
 2. Manufacturers and Products:
 - a. Master Builders Co., Cleveland, OH; Master Flow 928.
 - b. Euclid Chemical Co., Cleveland, OH; Hi-flow Grout.
- C. Curing Compound:
1. Material: Solvent based containing chlorinated rubber solids in accordance with ASTM C309-89e, with additional requirement that the moisture loss not exceed 0.030 gram per centimeter squared per 72 hours.
 2. Manufacturers and Products:
 - a. Master Builders Co.; Masterkure CR
 - b. Euclid Chemical Co.; Euco Super Floor Coat.
- D. Clear Floor Hardener (Surface-Applied): Colorless, aqueous solution of zinc and magnesium fluosilicate with a minimum 2 pounds of crystals per gallon.

1. Manufacturers:
 - a. Master Builders, Co., Cleveland, OH.
 - b. A.C. Horn, Inc., North Neren, NJ.
 - c. Sonneborn, Minneapolis, MN.

Part 3 Execution

3.01 Formwork

- A. Form Materials:
 1. Use hard plastic finished plywood for exposed areas, and new shiplap or plywood for unexposed areas.
 2. Earth cuts may be used for forming footings.
- B. Form Ties:
 1. Fixed conical or spherical type inserts that remain in contact with forming material and allow for dry packing of form tie holes.
 2. Ties shall withstand pressures and limit deflection of forms to acceptable limits.
 3. Wire ties are not acceptable.
- C. Construction:
 1. In accordance with ACI 347-89.
 2. Make joints tight to prevent escape of mortar and to avoid formation of fins.
 3. Brace as required to prevent distortion furring concrete placement.
 4. On exposed surfaces locate form ties in uniform pattern or as shown.
 5. Construct so ties remain embedded in the wall with no metal within 1 inch of concrete surface when forms, inserts, and tie ends are removed.
- D. Form Removal:
 1. Remove after concrete has attained 28-day strength, or approval is obtained in writing from Engineer.
 2. Remove forms with care to prevent scarring and damaging the surface.

3.02 Placing Reinforcing Steel

- A. Unless otherwise specified, place reinforcing steel in accordance with CRSI Recommended Practice for Placing Reinforcing Bars.

- B. Splices and Laps:
1. Top Bars: Horizontal bars placed such that 12 inches of fresh concrete is cast below in single placement.
 2. Horizontal wall bars are considered top bars.
 3. Lap top bars 50 diameters or minimum 37 inches.
 4. Lap all other bars 39 diameters or minimum 29 inches.
 5. Tie splices with 18-gauge annealed wire as specified in CRSI Standard.

3.03 Placing Concrete

- A. Place concrete in accordance with ACI 301-89.
- B. Prior to placing concrete, remove water from excavation and debris and foreign material from forms. Check reinforcing steel for proper placement and correct discrepancies.
- C. Before depositing new concrete on old concrete, clean surface using sandblast or bushhammer or other mechanical means to obtain a 1/4-inch rough profile, and pour a cement- sand grout to a minimum depth of 1/2-inch over the surface. Proportion 1 part cement to 2.5 parts sand by weight.
- D. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 2 feet deep. Place within 1-1/2 hours after adding cement to mix.
- E. 8 feet maximum vertical drop to final placement, when not guided with chutes or other devices to prevent segregation due to impact with reinforcing.

3.04 Compaction

- A. Vibrate concrete as follows:
1. Apply approved vibrator at points spaced not farther apart than vibrator's effective radius.
 2. Apply close enough to forms to vibrate surface effectively but not damage from surfaces.
 3. Vibrate until concrete becomes uniformly plastic.
 4. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

3.05 Construction Joints

- A. Locate as shown or as approved.
- B. Maximum Spacing Between Construction Joints: 40 feet.

3.06 Finishing

- A. Floor Slabs and Tops of Walls:
 - 1. Screed surfaces to true level planes.
 - 2. After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.
 - 3. Do not absorb wet spots with neat cement.
- B. Unexposed Slab Surfaces: Screed to true surface, bull float with wood float, and wood trowel to seal surface.
- C. Tolerances: Floors shall not vary from level or true plane more than 1/2 inch in 10 feet when measured with a straightedge.
- D. Exterior Slabs and Sidewalks:
 - 1. Bull float with wood float, wood trowel, and lightly trowel with steel trowel.
 - 2. Finish with broom to obtain nonskid surface.
 - 3. Finish exposed edges with steel edging tool.
 - 4. Mark walks transversely at 5-foot intervals with jointing tool.

3.07 Finishing and Patching Formed Surfaces

- A. Cut out honeycombed and defective areas.
- B. Cut edges perpendicular to surface at least 1-inch deep. Do not feather edges. Soak area with water for 24 hours.
- C. Finish surfaces to match adjacent concrete.
- D. Keep patches damp for minimum 7 days or spray with curing compound to minimize shrinking.
- E. Fill form tie holes with Nonshrink Grout.

3.08 Protection and Curing

- A. Protect fresh concrete from direct rays of sunlight, drying winds, and wash by rain.
- B. Keep concrete slabs continuously wet for a 7-day period. Intermittent wetting is not acceptable.
- C. Use curing compound only where approved by ENGINEER. Cure formed surfaces with curing compound applied in accordance with Manufacturer's directions as soon as forms are removed and finishing is completed.
- D. Remove and replace concrete damaged by freezing.

3.09 Floor Hardener

- A. Use where noted or scheduled.

- B. Follow manufacturer's application instructions.

3.10 Field Tests

- A. Evaluation of Concrete Field Strength: In accordance with ACI 318/318R-89.

(Remainder of this page intentionally left blank.)

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. The electrical work commences with the point of electrical service where shown on the Drawings and includes furnishing all material and labor for a complete electrical installation.
- B. The requirements of Division 1 apply to all work hereunder. The General and Special Conditions are a part of this Division of the Specifications and all provisions contained therein which affect this work are as binding as though incorporated herein.

1.02 DEFINITIONS

- A. Provide: Furnish, install, and connect.
- B. Product Data: Catalog cuts and descriptive literature.
- C. Shop Drawings: Factory prepared specific to the installation.
- D. Low Voltage: 0-600 volts.
- E. Indicated: Shown on the Drawings.
- F. Noted: Indicated or specified elsewhere.

1.03 MATERIAL NOT FURNISHED

- A. Unless otherwise noted, the following are furnished and installed under other Divisions:
 - 1. Motors
 - 2. Motor starters (except motor control centers)
 - 3. Building energy management systems
- B. Power wiring and equipment connections for the above items are included in this Division. Also included in this Division is control wiring to the extent shown on the Electrical Drawings; other control wiring is furnished under the applicable Division.

1.04 PERMITS AND FEES

The Contractor shall give all necessary notice, obtain all permits and pay all taxes, fees, and other costs, arrange and coordinate for all utility connections, in connection with his work and as defined in the General Conditions of the specifications.

1.05 QUALITY ASSURANCE

- A. Provide the complete electrical installation in accordance with the National Electrical Code (NFPA 70), Life Safety Code (NFPA 101), and in accordance with applicable local codes. Obtain all necessary permits and have all work inspected

by appropriate authorities.

- B. All products shall be designed, manufactured, and tested in accordance with industry standards. Where applicable, products shall be labeled or listed by third party certification agencies.
- C. Industry Standards: Standards organizations and their abbreviations, as used herein, are as follows. Applicable date for industry standards is that in effect on the date of advertisement of the Project.
 - 1. American National Standards Institute (ANSI)
 - 2. American Society for Testing and Materials (ASTM)
 - 3. Institute of Electrical and Electronics Engineers (IEEE)
 - 4. Insulated Cable Engineers Association (ICEA)
 - 5. National Electrical Manufacturers Association (NEMA)
 - 6. National Fire Protection Association (NFPA)
 - 7. Underwriters Laboratories, Inc. (UL)

1.06 SUBMITTALS

- A. Make all submittals in accordance with the requirements of Section 01340. Approval drawings consist of shop drawings, product data and other information as noted in

the individual equipment sections. Except as noted, submittal information is for approval and equipment may not be installed until submittals have been returned with stamped approval.
- B. Information required "for reference" such as product samples, similar unit test reports and time current curves is for the purpose of determining the suitability of a product, selecting breaker settings, etc. This information is to be submitted at the same time as approval data; however, this information will not be returned and stamped approval is not required prior to installation.
- C. Except as noted, installation instructions are not required to be submitted. However, it is the Contractor's responsibility to obtain installation information from the manufacturer for all equipment prior to installing the equipment.

1.07 RECORD DRAWINGS

- A. Furnish record drawings in accordance with the requirements of Section 01720. Record drawings consist of submittal data as listed above, operation and maintenance data, and as-built drawings. Record drawings are to reflect the final installation, including any changes during approval, manufacturing tests, and installation.
- B. In addition to other required sets, furnish one set of operation and maintenance data for all apparatus requiring service. This set is to be bound in hardback, 3-ring binder(s) located in a hinged metal cabinet in the main electrical room and shall include:

1. Title page with project name; installing contractor's name, address and telephone number; date of installation and warranty period.
 2. Index sheet.
 3. Complete manufacturer's operation and maintenance data with tabs (corresponding to the index) separating each item or system. Include the name, address, and phone number of the nearest sales and service organization for each item.
- C. As-Built Drawings: Furnish one set of mylar sepias maintained at the job site at all times with all changes during construction marked thereon. Include on the as-built drawings sufficient dimensions to permit location of underground conduits.
- D. Submit the results of any tests required in the individual equipment sections.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Ship products to the job site in their original packaging. Receive and store products in a suitable manner to prevent damage or deterioration. Keep equipment upright at all times.
- B. Investigate the spaces through which equipment must pass to reach its final destination. Coordinate with the manufacturer to arrange delivery at the proper stage of construction.

PART 2 PRODUCTS

2.01 MATERIALS

Provide only new products of the manufacturer's latest design.

2.02 SUBSTITUTIONS

- A. Where the words "equal to" follow or precede the listed acceptable manufacturers, equal products of other manufacturers are acceptable and request for substitution may be made during submittal stage.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The complete installation is to be accomplished by skilled electrical tradesmen, with certified or suitably qualified individuals performing all special systems installation and testing. All workmanship shall be of the highest quality, sub-standard work will be rejected.
- B. Schedule the work and cooperate with all trades to avoid delays, interferences, and unnecessary work. If any conflicts occur necessitating departures from the Drawings and Specifications, details of departures and reasons therefore shall be submitted immediately for the Engineer's consideration.
- C. Prior to final inspection, clean all dirt, mud and construction debris from all boxes, cabinets, manholes and equipment enclosures.

3.02 CERTIFICATION AND TESTS

- A. Prior to request for final review, test all systems and repair or replace all defective work. Submit, with request for final review, written certification that all electrical systems are complete and operational.
- B. At the time of final review of electrical work, demonstrate the operation of electrical systems. Furnish labor, apparatus and equipment for systems' demonstration.
- C. After final review and acceptance, turn over to the Owner all keys for electrical equipment locks. Present to the Owner or the Owner's designated representative, demonstrations and oral instructions for proper operation and maintenance of the electrical equipment and systems.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. Rigid metal conduit and fittings.
- B. PVC coated RGS conduit.
- C. Flexible metal conduit and fittings.
- D. Liquidtight flexible metal conduit and fittings.
- E. Non-metallic conduit and fittings.

1.02 SUBMITTALS

Do not submit equipment specified in this Section.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Conduit: Allied, Republic, Triangle or Wheatland.
- B. PVC Coated Conduit and Fittings: Permacote, Robroy or Occidental.
- C. PVC Conduit: Amoco, Canon or Certainteed.
- D. Flexible Conduit: Anaconda, Thomas & Betts, Electric Flex or Triangle.
- E. Fittings: Appleton, Crouse-Hinds, Oz or Thomas & Betts.
- F. Substitutions: Products equal to those listed.

2.02 RIGID METAL CONDUIT AND FITTINGS

- A. Rigid Steel Conduit: UL 6; ANSI C80. 1; hot dip galvanized; minimum size 3/4-inch.
- B. PVC Coated Conduit: NEMA RN-1; galvanized rigid steel conduit with factory applied external 40 mil PVC coating and urethane interior coating. Prior to coating, treat conduit with a heat polymerizing adhesive so the bond between metal and coating is greater than the tensile strength of the coating. Minimum size 3/4-inch.
- C. Fittings and Conduit Bodies: NEMA FB-1; zinc coated; taper-threaded type, material to match conduit. Where PVC coated conduits are indicated all couplings, fittings, conduit bodies, pipe straps, U bolts, beam clamps, flex connections and other accessories shall have factory applied PVC coating. Use PVC coated hubs for connection of coated conduits - locknuts are not acceptable.

2.03 FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Conduit: UL 1; FS WW-C-566; single steel continuous strip with galvanized coating; minimum size 3/8-inch.
- B. Fittings and Conduit Bodies: NEMA FB-1; malleable iron squeeze type.

2.04 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

- A. Conduit: UL listed liquidtight consisting of an extruded thermoplastic cover over a galvanized steel core. Minimum size 3/4-inch. Exception: Where connected to devices with manufacturer supplied 1/2 or 3/8-inch hubs, match conduit size to hub size.
- B. Fittings and Conduit Bodies: NEMA FB-1; galvanized steel compression type with O-ring. Where PVC coated conduits are indicated, provide PVC coated fittings for flex connections.

2.05 RIGID NONMETALLIC CONDUIT AND FITTINGS

- A. Conduit: NEMA TC-2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC-3.

PART 3 EXECUTION**3.01 CONDUIT SCHEDULE**

- A. Except as noted, use only PVC coated sized galvanized steel.
- B. Use liquidtight flexible steel conduit for connections to motors, transformers and other vibrating equipment.
- C. Non-jacketed flexible steel conduit may be used for connections to lighting fixtures in suspended ceilings.
- D. Use PVC coated conduits where conduits are in direct contact with earth.
- E. Rigid nonmetallic conduit may be used for underground, concrete encased duct banks and in or below slab on grade.
- F. Where PVC conduit is indicated, make a transition to rigid steel below grade or slab and continue above with rigid steel conduit.

3.02 CONDUIT ARRANGEMENT AND SUPPORT

- A. Arrange conduit to maintain headroom and present a neat appearance. Run exposed conduits parallel or perpendicular to building surfaces and adjacent piping. Group conduit in parallel runs where practical and provide rack space for 25 percent additional conduits. Use concentric bends for parallel runs.
- B. Avoid sources of heat when possible. Where unavoidable, maintain 3-inch clearance when crossing hot pipes and 12-inch clearance between parallel hot pipes, flues, heating appliances and other heat sources.
- C. Support conduits to prevent distortion of alignment by wire pulling operations. Fasten single conduits with one hole malleable iron straps. For multiple runs use channel and clamps. Wire, perforated pipe straps and the like are not acceptable support means.
- D. Support conduit at a maximum of seven feet on center and within three feet of each box, cabinet, or fitting. Hang trapeze assemblies with threaded rods not less than 3/8-inch diameter. Remove all temporary supports prior to pulling conductors.

3.03 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipecutter and de-burr cut ends. Paint threads with zinc compound. Bring conduit to the shoulder of fittings and couplings and fasten securely. All connections are to be wrench tightened and electrically continuous. No running threads are permitted.
- B. Use conduit hubs for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations. Use conduit bodies to make sharp changes in direction. For sizes 2-inches and larger, use "LD" or similar fittings to permit a straight pull from either direction.
- C. The maximum length between pull points is 400 feet. This length shall be reduced by one foot for each degree of bend.
- D. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size. Crushed or deformed conduits may not be installed.
- E. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- F. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture. Install threaded PVC end caps on conduits stubbed up for future use.
- G. Provide a 200 pound tensile strength polyolefin line pulled through and tied off at each end of all empty conduits.
- H. Install expansion joints where conduit crosses building expansion joints and for straight runs in excess of 100 feet.
- I. Where conduit penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating.
- J. Provide watertight seals, equal to OZ type WSK or FSK, where conduit penetrates exterior walls and where conduit passes between spaces normally at different temperatures. Seal duct bank and underground conduit entry with GE or Dow silicone sealant.
- K. Provide silicone sealant equal to Dow or GE for conduit entry in outlet boxes and equipment enclosures (all conduit ends except pull boxes and fittings) for the following areas:
 - 1. Outdoor Areas
 - 2. Indoor Areas
- L. In locations where the conduit cannot be turned, provide three piece threaded rigid couplings. Provide clamp backs for conduits on exterior or damp surfaces to prevent the raceway from bearing directly on the damp surface.
- M. Route conduits in slabs above the bottom reinforcing and below the top reinforcing. Maximum size for conduits in slabs above grade is 1-inch. Route so conduits in slabs above grade do not cross.
- N. Protect conduit threads from rust and damage during construction.
- O. PVC Conduit Bends: Do not use methods, which will deform or change the physical characteristics of the conduit. Use PVC-coated rigid steel factory elbows for bends in runs longer than 100 feet, and in runs, which have more than two bends, regardless of length. Exception: Where concrete encased in slab or ductbank, GRS elbows may be used in lieu of

PVC coated.

- P. Wipe plastic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.
- Q. PVC Coated Conduit: Exercise care not to damage the coating during cutting, threading, bending, and assembly. Follow the manufacturer's installation instructions. Use vise jaws, bending equipment, strap wrenches, and other tools which are specifically designed for coated conduits. Do not use chain vise, pipe wrench, channel locks or the like. Nicks or small damaged areas (1/2-inch maximum) may be repaired with a manufacturer approved compound. Replace items if coating is damaged in excess of 1/2-inch.
- R. Conductor Protection: Provide bushings on metallic and bell ends on PVC conduits unless conduit terminates in a hub or similar fitting.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. Building wire.
- B. Cable.
- C. Wiring connections and terminations.

1.02 SUBMITTALS

Submit product data.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Conductors 600 Volts and Below: Equal to Aetna, American, Cablec, Continental, Okonite, Pirelli, Southwire or Triangle.
- B. Signal Circuit Conductors: Equal to Belden, Continental, Dekoron or Penn.
- C. Connectors 600 Volts and Below: Equal to Burndy, Thomas & Betts, Ideal or OZ.
- D. Pulling Compounds: Equal to Ideal Yellow 77, Electro Y-ER-EAS, Minerallac 100 or Burndy Slikon.
- E. Wire and Cable Markers: Plastic, split sleeve or tubing type, equal to Brady Type XC or T & B Type SM.

2.02 BUILDING WIRE

- A. Lighting & Receptacles: Single conductor, 98% conductivity copper, 60 C, 600 Volt, thermoplastic insulated, Type TW, minimum size #12 AWG.
- B. Feeder and Branch Circuits: Single conductor; 98 percent conductivity copper; 90 degrees C; 600 volt PVC insulated with nylon jacket; type XHHW. Minimum size #12 AWG.
- C. Control Circuits: Same as specified above for feeder and branch circuits, except minimum size #14 AWG.

2.03 REMOTE CONTROL AND SIGNAL CABLE

- A. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor; 600 volt insulation, rated 60 degrees C; individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.
- B. Instrumentation Signal Cables: #16 AWG stranded tinned copper conductors; 600 volt polyethylene insulation; twisted pair or three conductor construction; 100 percent coverage aluminum polyester shield; #18 stranded tinned copper drain wire; vinyl outer jacket; UL listed.

PART 3 EXECUTION**3.01 GENERAL WIRING METHODS**

- A. Use only stranded conductors. Exception: Solid conductors size #12 and #10 AWG may be used for lighting and receptacle branch circuit wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet, and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.
- C. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- D. Identification: All conductors shall be identified throughout the electrical system. For control and signal conductors use wiremarkers at all terminals and connections. Color code power circuit conductors as follows:

	120/240 Volt System
Phase A	Black
Phase B	Red
Neutral	White
Ground	Green

- E. For conductors #8 AWG and larger color coding may be accomplished with 1-inch wide colored tape applied at each end of the conductor or at points where conductor is accessible so as to be visible inside the enclosure.
- F. Neatly train and lace wiring inside boxes, equipment and panelboards. Support to prevent conductor movement under fault conditions.

3.02 WIRING INSTALLATION IN RACEWAYS

- A. Unless otherwise indicated, install all conductors in conduit.
- B. Pull all conductors into a raceway at the same time. Thoroughly swab raceway system before installing conductors. Use wire pulling lubricant for all pulls. Do not exceed the manufacturer's pulling tension.
- C. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

3.03 WIRING CONNECTIONS AND TERMINATIONS

- A. Avoid unnecessary splices. Splice only in accessible junction or outlet boxes.
- B. Make connections to circuit breakers, disconnect switches, panel mains, etc. with solderless lug s.
- C. Use mechanical connectors for low voltage splices, taps, fixture and motor connections. Exception: Square thread helical spring plastic cap (wire nut) type connectors are acceptable for solid conductor splices and taps.

- D. Use insulated throat, spade type crimp on connectors for strap screw device terminals. Exception: Receptacle back wiring provisions may be used for terminating solid conductors.
- E. Where possible use connectors with integral, insulating covers. Otherwise tape uninsulated conductors and connectors to 150 percent of the insulation value of conductor.
- F. Thoroughly clean wires before installing lugs and connectors.
- G. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

3.04 FIELD QUALITY CONTROL

- A. Inspect wire and cable for physical damage and proper connection.
- B. Torque test conductor connections and terminations to manufacturer's recommended values.
- C. Continuity Tests: Ring all conductors for continuity and replace any open conductors.
- D. Low Voltage Ground Fault Tests: Meggar all feeder circuits for grounds. Compile and submit a list of meggar readings. Replace all conductors measuring less than 2 megohms to ground.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. Wall switches.
- B. Receptacles.
- C. Device plates and box covers.

1.02 SUBMITTALS

Submit product data.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

Switches and Receptacles: Equal to Arrow Hart, Bryant, GE, Hubbell, Leviton SpecMaster, Pass and Seymour or Sierra.

2.02 SWITCHES AND RECEPTACLES

- A. Wall Switches: NEMA WD-1; FS W-S-896; 20 amp, 120/277 volt, specification grade; horsepower rated; quiet type; back and side wiring provisions; toggle handle.
- B. Convenience Receptacles: NEMA WD- 1; 15 AND 20 amp (as shown on Drawing) 125 volt, specification grade; impact resistant nylon face; back and side wiring provisions; grounding screw.
- C. Specific Use Receptacles: NEMA WD-1 or WD-5; type as indicated. For branch circuits serving a single device, match device rating to branch circuit rating.
- D. GFI Receptacles: Heavy-Duty grade, with integral NEMA WD6, Configuration 5-20R duplex receptacle, complying with UL 498 and UL 943.

2.03 WALL PLATES

- A. Weatherproof NEMA 4X) Cover Plates: Stainless steel, specification grade, gasketed equal to Sierra WP Series. For heat tape, instruments, or other devices which are continuously plugged in, provide impact resistant polycarbonate, suitable for wet locations while in use, equal to TayMac safety outlet enclosures.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Secure devices to outlet boxes without depending on device plates to pull them tight. Install a bonding jumper between all devices and outlet boxes.
- B. Install switches with off position down; and receptacles with grounding pole on bottom.
- C. Derate ganged dimmers as instructed by manufacturer; do not use common neutral.

- D. For cord and plug connected equipment, coordinate receptacle configuration with equipment supplied.
- E. Corridor Convenience Receptacles: Hospital grade.
- F. Install device plates on switch, receptacle, and blank outlets. Use jumbo size plates for devices installed in masonry walls.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks and accessories.

1.02 SUBMITTALS

- A. Submit product data.
- B. Shop Drawings for Equipment Panels: Include schematic diagram, wiring diagram, outline drawing and construction diagram as described in NEMA ICS-1.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

Cabinets and enclosures shall be equal to Crouse Hinds, Hoffman or Weigmann.

2.02 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250; 10 gauge stainless steel or FRP, no knockouts, wall mounted or free-standing as indicated. Free-standing enclosures are minimum 20-inches deep. Unless otherwise noted, enclosures are NEMA 12 for indoor dry locations and NEMA 4X for outdoor, wet or damp locations.
- B. Covers: Continuous hinge, held closed by hasp and staple for padlock. Furnish three point latch for free standing enclosures.
- C. Panel for Mounting Terminal Blocks or Electrical Components: 14 gauge stainless steel or FRP.
- D. All electrical and instrumentation components located in Class I, Division 2, Group D areas shall be housed and fitted for NEMA 7 enclosures or listed as intrinsically safe or explosion-proof.

2.03 TERMINAL BLOCKS AND ACCESSORIES

- A. Terminal Blocks: NEMA ICS-4; UL listed.
- B. Power Terminals: One-piece phenolic closed-back type, with binding screw or stud terminal connectors, rated 600 volts.
- C. Signal and Control Terminals: Modular construction type, channel mounted with marking strip; screw terminals, rated 300 volts.

2.04 FABRICATION

- A. Shop assemble enclosures and cabinets housing terminal blocks or electrical components in accordance with NEMA ICS-6.

- B. Selectors and Indicators: Door mounted for indoor enclosures. For outdoor enclosures provide a separate, hinged, inner door (dead front panel) for device mounting.
- C. Lace conductors with plastic ties to present a neat and orderly appearance. Provide nylon wrapping to protect conductors crossing hinges.
- D. Provide protective pocket inside front cover with control wiring and panel layout diagrams.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install cabinets and enclosures plumb, anchor securely to wall and structural supports at each corner, minimum.
- B. Provide accessory feet for free-standing equipment enclosures.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. Conduit and equipment supports.
- B. Fastening hardware.

1.02 SUBMITTALS

Do not submit equipment specified in this Section.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

Prefabricated structural systems shall be equal to B-Line Systems, Kindorf, Powerstrut or Unistrut.

2.02 MATERIAL

- A. Support Channel: Stainless steel.
- B. Hardware: Stainless steel.
- C. Threaded Rods: 3 /8-inch diameter, stainless steel.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using precast insert system expansion anchors preset inserts.
- B. Use expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- D. Do not use powder-actuated anchors.
- E. Do not use perforated straps or wire.
- F. Make all supports from the structure, not the work of other trades. Do not drill structural steel members. Install supports so as not to weaken the structure.
- G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- H. In wet locations install free-standing electrical equipment on concrete pads.
- I. Install surface-mounted cabinets and panelboards with minimum of four anchors.

- J. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

- A. This section covers the work necessary to furnish and install, complete, the electrical grounding system.

1.02 RELATED WORK SPECIFIED AND PERFORMED UNDER OTHER SECTIONS

<u>Section No.</u>	<u>Item</u>
16000	Electrical-General Provisions
16111	Conduit
16120	Wires and Cables
16150	Motors
16160	Cabinets and Enclosures
16470	Panelboards
16510	Lighting

1.03 SUBMITTALS

- A. Submittals: Shall be made in accordance with Section SUBMITTALS in Division 1, GENERAL REQUIREMENTS, and Section ELECTRICAL-GENERAL PROVISIONS.

PART 2 PRODUCTS**2.01 MATERIALS****2.02 GROUND RODS**

- A. Provide copper-clad steel ground rods not less than 3/4-inch diameter, 10 feet long driven full length into the earth. Special requirements shall be as shown and as specified herein.

2.03 GROUND CONDUCTORS

- A. Provide grounding conductors of the size shown and the type specified in Section CONDUCTORS.

2.04 GROUND CONNECTIONS

- A. For below grade connections, provide exothermic-welded type of connectors as manufactured by Cadwell, Thermoweld, or equal, or compression type connectors designed for this special purpose manufactured by Burndy, Thomas and Betts, or equal.

PART 3 EXECUTION**3.01 GENERAL**

- A. Except where specifically indicated otherwise, ground all exposed noncurrent-carrying metallic parts of electrical equipment, raceway systems, and the neutral of all wiring systems in strict accordance with the NEC, states, and other applicable laws and regulations.

- B. Where grounding conductors are shown, bond the wires to metallic enclosures at each end and to all intermediate metallic enclosures. Connect grounding conductors to all grounding bushings on raceways. Where any equipment contains a ground bus, extend and connect grounding conductors to that bus. Connect the enclosure of the equipment containing the ground bus to that bus. Run ground conductors inside conduits enclosing the power conductors.
- C. Make connections of any grounding conductors to motors 10 horsepower and above or circuits 20 amps or above by a solderless terminal and a 5/16" minimum bolt tapped to the motor frame or equipment housing. Ground connections to smaller motors or equipment may be made by fastening the terminal to a connection box. Connect junction boxes to the equipment ground system with grounding clips mounted directly on the box or with 3/8" machine screws. Completely remove all paint, dirt, or other surface coverings at grounding conductor connection points so that good metal-to-metal contact is made.
- D. Install sufficient ground rods in addition to code required grounding so that resistance to ground as tested by standard methods does not exceed 10 ohm unless otherwise accepted. Where more than one rod is required, install rods at least 10 feet apart or extend the length of the rod.
- E. Ground shields of any shielded power cable at each splice or termination in accordance with recommendations of the splice or termination manufacturer. Ground shields of any instrumentation cables in accordance with the details shown at only one location.
- F. Ground metal sheeting and any exposed metal vertical structural elements of buildings. Ground metal fences enclosing electrical equipment. Bond any metal equipment platforms, which support electrical equipment of that equipment. Provide good electrical contact between metal frames and railings supporting pushbutton stations, receptacles, instrument cabinets, etc., and raceways carrying circuits to these devices.
- G. Bond neutrals of transformers within building to the system ground network, and to any additional indicated grounding electrodes.

3.02 GROUNDING CONNECTIONS

- A. Unless shown otherwise, make connections of grounding conductors to ground rods at the upper end of the rod with the end of the rod and the connection point below finished grade.
- B. Make connections of sections of outdoor ground mats (counterpoise) for substations or other equipment underground. Make connections of other grounding conductors generally accessible.
- C. When making thermite welds, wire brush or file the point of contact to a bare metal surface. Use thermite welding cartridges and molds in accordance with the manufacturer's recommendations. After welds have been made and cooled, brush slag from the weld area and thoroughly clean the joint. For compression connectors, use homogeneous copper, anti-corrosion, surface treatment compound at connectors in accordance with connector manufacturer's recommendations. Use connectors of proper size for conductors and ground rods specified. Use connector manufacturer's

compression tool. Notify Engineer prior to backfilling any ground connections.

3.03 FIELD TESTS

- A. Test in the Engineer's presence the ground resistance of the grounding system.
- B. Test all ground fault interrupter (GFI) receptacles and circuit breakers for proper connection and operation with methods and instruments prescribed by the manufacturer.
- C. Provide copies of reports of all grounding system tests for inclusion in Operation and Maintenance Manuals and for review by the Engineer.

END OF SECTION

PART 1 GENERAL**1.01 DESCRIPTION**

- A. This section specifies panelboards for lighting and power distribution.

1.02 REFERENCES

- A. This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

<u>Reference</u>	<u>Title</u>
NFPA 70	National Electrical Code (NEC)
UL 67	Electric Panelboards
UL 489	Molded-Case Circuit Breakers and Circuit Breaker Enclosures
UL 50	Cabinets and Boxes
NEMA PB1	Electric Panelboards

1.03 SUBMITTALS

The following submittals shall be provided:

1. A copy of this specification section with addenda updates and all referenced sections with addenda updates, with each paragraph check marked to show specification compliance or marked to show deviations.
2. Manufacturer's catalog data indicating general features and dimensions of devices.
3. Manufacturers certification that bus bracing is capable of withstanding the specified short circuit condition.
4. Quantity and rating of circuit breakers provided with each panelboard.

1.04 IDENTIFICATION

- A. Provide a typewritten directory of circuits controlled. Install on back of door.

PART 2 PRODUCTS**2.01 ARRANGEMENT AND CONSTRUCTION**

- A. The front of the panel shall have concealed trim clamps and hinges. The locks shall flush with cylinder tumbler-type with spring loaded door pulls. The fronts shall be removable with doors in the locked position. All panelboard locks shall be keyed alike.
- B. Gutter space shall be provided on all sides of the breaker assembly to neatly arrange incoming wiring.
- C. Panelboard shall be composed of individually mounted circuit breakers designed to be removable without disturbing other breakers.

- D. A directory holder with clear plastic plate and metal frame shall be mounted on the inside of the door.

2.02 VOLTAGES

- A. Panelboards shall be designed for voltages as scheduled or indicated in the Drawings

2.03 BUS MATERIAL

- A. Bus shall be aluminum and shall have current ratings as shown on the panelboard schedules, sized in accordance with UL 67. Ratings shall be determined by temperature test. Minimum bus size shall be 100 amperes.
- B. Panelboards shall be provided with a separate ground bus and a full capacity neutral bus.

2.04 CABLE CONNECTIONS

- A. All cable connection lugs shall be copper alloy, rated for the type of material to which connected.

2.05 TYPE MAINS

- A. Main lugs or main breakers shall be provided as indicated in the drawings.

2.06 CIRCUIT BREAKERS

- A. Protective devices in panelboards shall be molded case thermal-magnetic, automatic circuitry breakers of frame types, number poles, trip ratings and quantities as scheduled on the Drawings, complying with UL 489 and as described below.
- B. Main and branch breakers shall be rated for the fault current level indicated on the drawings, minimum 10,000 amperes for 240/120 volt system, RMS symmetrical.
- C. Multipole breakers shall have internal common trip.
- D. Bolt-on circuit breakers.

2.07 CABINETS

- A. Cabinets shall be NEMA type 4X for all locations or as shown on Drawings. Mounting shall be flush or surface as indicated on the Plans. Door shall have cylinder lock. A minimum 8" wide gutter shall be provided on the top or bottom of panelboards to accommodate the feeder lug connections to the panelboard bussing or main breaker. Gutter space shall be a minimum of 4" on all sides around the panel. Provide with hinged trim construction.

2.08 MANUFACTURERS

- A. Panelboards shall be manufactured by Square D, Cutler Hammer, General Electric.

2.09 SPACES

- A. All spaces in a panelboard shall have all bussing installed so that a breaker can be

installed without any additional work.

PART 3 EXECUTION

3.01 ELEVATION

- A. Unless otherwise indicated, install top of branch lighting and receptacle panelboard cabinets 6'-6" above finished floor.

3.02 SUPPORT

- A. Panelboards shall be anchored firmly to the building structure.
- B. All circuits shall be connected to the poles in the panelboard that are indicated on the Plans.

3.03 TESTING

- A. Perform the following field tests and inspections:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION

PART 1 GENERAL**1.01 DESCRIPTION**

- A This Section covers all lighting fixtures both interior and exterior.

1.02 REFERENCED DOCUMENTS:

- A Industry Standards:
1. American National Standards Institute (ANSI): C62.41, IEEE recommended practice on surge voltages in low voltage AC power circuits
 2. National Fire Protection Association (NEPA): 70, National Electrical Code (NEC)
- B. Government Standards: U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): Code of Federal Regulations, Title 29, Chapter XVII:

1.03 EXACT LOCATIONS

- A. Fixtures shall be installed as indicated by symbol, letter notation and special notes on the Drawings. Letter notations correspond to lighting fixture schedule on the Drawing.

1.04 SUBMITTALS

- A. Submit shop drawings, bills of materials, manufacturers' literature, and samples.
- B. Shop Drawings; Show specially fabricated fastening and supporting devices and details of assemblies and subassemblies. Submit shop drawings of light fixtures indicated in light fixture schedules and details.
- C. Bills of Materials: List each part identified by a part number or manufacturer's number. Referenced bills of materials to shop drawings.
- D. Manufacturers' Literature: Describe lighting products, indicated appurtenances; include photometric data.

PART 2 PRODUCTS**2.01 SUSPENDED FIXTURES**

- A. All suspended fixtures shall have rigid stem pendants and swivel aligners ~ fluorescent fixtures shall have twin-stem hangers; row fixtures shall have single hangers at 4' to 8' spacing.

2.02 OUTDOOR FIXTURES

- A. Fixtures shall be able to withstand harsh environmental of pump stations and suitable for NEMA 4x application.

2.03 CONDUCTORS

- A. As specified in Section 16120, WIRE AND CABLE.

2.04 JUNCTION AND PULL BOXES

- A. Outdoor boxes: NEMA 4X.

- B. Other boxes; steel, malleable iron, or ductile iron, and hot-dip galvanized after fabrication

2.05 CONDUIT AND CONDUIT FITTINGS

- A. Outdoor and wet well areas shall be NEMA 4x; all other areas rigid galvanized conduit.

2.06 FIXTURES

- A. See Light Fixture Schedules and Details for descriptions of each fixture.

2.07 BALLAST

- A. Fluorescent shall have a power factor of not less than 90 percent. Fluorescent fixture be Class P. and have a starting temperature of not cooler than 50 degrees Fahrenheit
- B. Magnetek Electronic Ballast shall be furnished.

2.08 LAMPS

- A. See Light Fixture Schedule for specific requirements of each lamp.

2.09 ELECTROMAGNETIC SHIELDING FOR FLUORESCENT FIXTURES

- A. UL listed
- B. Diffuser: Either an electrically conductive American Saint-Gobain EC-73 glass or KSH-12RF acrylic diffuser, or accepted equivalent. Ground diffuser to fixture housing accordance with recommendation of diffuser manufacturer.

PART 3 EXECUTION

3.01 WIRING

- A. All fixtures shall be completely wired.

3.02 SUPPORT

- A. The interior lights shall be supported from structures. Exterior lights shall be pole or wall mounted as shown on drawings.

3.03 ALIGNMENT

- A. Stem connections to outlet boxes shall be made with swivel aligner box covers. Stems and rods not connected into a raceway system shall be supported with non-rigid connection points, which will allow the stem or rod to hang vertically.

3.04 VOLTAGE

- A. See Drawings for voltage requirements of each lighting fixture.

3.05 FIXTURE DESIGNATIONS

- A. The light fixture model numbers listed on the drawings may not provide all items necessary for a complete installation. Contractor shall provide all items necessary or as verbally described to make the installation complete and correct.

3.06 CEILING TYPE

- A. The Contractor shall examine the type of ceiling before installation of the light fixtures as shown on electrical lighting Drawings. Supports shall be installed as required.
- B. All accessories for complete installation shall be provided so that the U.L. label will be maintained.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE**

Transient voltage surge suppressors (TVSS).

1.02 QUALITY ASSURANCE

- A. UL 1449 (Second Edition)
- B. UL 1283 (EMI and RFI Filtering)
- C. ANSI/IEEE C62.41 (Standards for surge withstand capabilities)
- D. IEEE C62.45
- E. NEMA LS-1 (National Electrical Manufacturer's Association Specification guideline for low voltage surge protective services).

1.03 UBMITTALS

- A. Submit shop drawings, instructions and manufacturer's data on all products.
- B. Provide verification the TVSS device complies with the required UL 1449 (ANSI/IEEE C62.41 Cat.C1 -6kV, 3kA) surge voltage ratings (SVR).
- C. Provide actual let-through voltage test data results for IEEE C62.41 Cat.C3 (20kV, 10kA), Cat.C1 (6kV, 3kA), and Cat.B3 (6kV, 500A @ 100kHz) tested in accordance with IEEE C62.45.
- D. Provide test reports for a recognized independent testing laboratory verifying that the suppressors can survive the published surge current rating on a per mode and per phase basis. The test wave shall be the ANSI/IEEE C62.41, 8x20 microsecond current wave.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

The units shall be manufactured by Cutler-Hammer, Current Technology, or Advanced Technology, Inc.

2.02 DESIGN

- A. The unit shall consist of metal oxide varistors (MOV's) connected together such that all components shall share surge currents in a seamless, low-stress manner. All internal components shall be hardwired utilizing low-impedance connections.
- B. The Unit shall include a high performance EMI/RFI noise rejection filter. Noise attenuation shall be no less than 45 dB at 100 kHz.
- C. Provide internal fusing, rated 200 kAIC for each suppression element.
- D. Provide integral disconnect switch.
- E. Diagnostics: Provide phase failure indication lights (LED's) on the front of the enclosure door. Provide dry contact (10 amp, 120 V AC) for remote failure alarm indication.

- F. Enclosure: Provide NEMA 12 (minimum) enclosure for indoors and a NEMA 4 (minimum) enclosure for outdoor applications.
- G. Provide safety lock on door.

2.03 ELECTRICAL REQUIREMENTS

- A. Unit operating voltage: Voltage and unit configuration as indicated.
- B. Maximum continuous operating voltage (MCOV): The MCOV shall be greater than 115 percent if the nominal system operating voltage
- C. Protection Modes
 - 1. Wye configured system: Direct connected suppression elements between line to neutral (L-N), line to ground (L-G), and neutral to ground (N-G).
 - 2. Delta configured system: Direct connected suppression elements between line to line (L-L) and line to ground (L-G).
- D. Rated Surge Current Capacity: Unless otherwise indicated, total surge current (ANSI/IEEE C62.41, 8x20 microsecond waveform) that the device is capable of surviving shall not be less than:

Application	Surge Current (kA) per Phase	Surge Current (kA) per Mode
Service Entrance: Switchboards, Switchgear, MCCs	250	125
Distribution: Distribution Panelboards, MCCs	160	80
Utilization: Branch Circuit Panelboards	80	40

- E. Surge Voltage Rating (SVR): Maximum UL 1449 (IEEE Category C1) SVR shall not exceed the following:

Modes	240Y/120 Volts
Delta: L-N, L-G, N-G	400 volts
Delta: L-L, L-G	800 volts

- F. Let Through Voltage: Maximum let through voltages shall not exceed the following:

Voltage	Modes	ANSI/IEEE Cat. B3	ANSI/IEEE Cat. C3
208Y/120	L-N	170 volts	500 volts

- G. Warranty: Seven (7) year replacement

PART 3 EXECUTION

3.01 INSTALLATION

- A. To ensure maximum performance and optimum protection, install unit as close as possible to the protected equipment.
- B. Install all wiring between unit and connected equipment in rigid metal conduit. Twist and bind together all leads and route wires such that their overall length is kept to a minimum.

- C. Provide any other installation and start-up procedures as required by the specific equipment manufacturers.

PART 4**4.01**

- A. Manufacturer's Rep shall be on-site for start-up and test procedures. Factory trained representative shall test the installed unit with a portable surge generator to verify that the unit suppresses voltage within factory guidelines – in all modes. Also, test will verify the integrity of the neutral to ground bond. Additionally, testing shall be done to verify 100% suppression capability per phase of the MOV's. Test report shall be sent to specifying engineer to verify performance.

END OF SECTION

PART (I) - FLOW METERING:**1. GENERAL****1.01 SCOPE OF WORK**

- A. The CONTRACTOR shall provide all electromagnetic induction flow metering equipment, concrete meter vault and all appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents. The equipment shall be compatible with magnetic inductive flow converter transmitter specified in PART (II) - Process Instrumentation and Control Systems.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards
- | | |
|-------------|--|
| ANSI B 16.5 | Specification Flanges, and Pipe Fittings |
| ANSI CLASS | 300 LBS |
| NEMA 6P | Suitable for short-time submersion |

1.03 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall submit complete shop drawings of meter tube.
The CONTRACTOR shall furnish a concrete meter vault as shown on the plans.

1.04 MANUFACTURERS REPRESENTATIVE

- A. The CONTRACTOR shall provide the services of a factory service representative to supervise the installation and initial operation of all equipment specified herein.
- B. The manufacturer must submit a training plan and draft of training manual for the approval of the Engineer and Owner. Training shall be conducted according to the requirements established by the engineer and shall include but not be limited to the following:
1. Explanation of operation of all components provided.
 2. Troubleshooting all components in case of failure.
 3. Full explanation and demonstration of proper calibration.
 4. Explanation of preventative maintenance procedures.

1.05 EQUIPMENT WARRANTY

The electromagnetic meter supplier is fully responsible for the proper operation of all components provided for a period of 2 years from date of installation. In cases where equipment is provided along with the electromagnetic meter, the electromagnetic meter shall carry a 2 year warranty and the additional equipment shall carry a 5 year warranty. Warranty is considered applicable for failure due to materials and/or workmanship.

1.06 PERFORMANCE WARRANTY

The electromagnetic meter supplier is fully responsible for the proper operation of all equipment provided and shall certify in writing that a full review of the contract drawings has been done and there are no exceptions to the field requirements of the meter. Additionally, the manufacturer shall insure that over the stated range of flow rates, the

meter will perform properly. Any deviation from proper performance, which develops due to the improper sizing of the electromagnetic meter, shall result in the meter manufacturer removing the improper meter and replacing it with one that meets the criteria at no cost to the owner.

1.07 PREQUALIFICATION INFORMATION

A. The General Contractor's attention is directed to the fact that the Flow Monitoring System shall be an integrated system and, as such, shall be furnished by a single approved Instrumentation and Control System Integrator who shall provide all of the instruments, equipment, and appurtenances regardless of manufacture, and who shall be responsible to the General Contractor for the complete and satisfactory operation of the entire SCADA system.

1. These specifications cover the intended functionality of the equipment, but do not necessarily cover all details necessary for a complete, operable and functional system. The Instrumentation and Control System Integrator shall supply all devices and appurtenances necessary to provide a complete, operable and satisfactory system as indicated or specified.
2. The General Contractor shall be fully and solely responsible for the work of the Instrumentation and Control System Integrator and solely responsible to the Owner for having supplied to the Owner the complete supervisory control and data acquisition system.
3. The General Contractor shall provide personal superintendence and direction to the work, maintaining and supplying complete supervision over and coordination between all subcontractors employed by him.
4. The General Contractor shall be responsible for defining the limits of the Instrumentation and Control System Integrator's work.

B. Pre-approved Instrumentation and Control System Integrators:

1. It is the intent of these specifications and drawings that a qualified Instrumentation and Control System Integrator provide the system as specified and indicated.
2. The Instrumentation and Control System Integrator shall furnish a complete, integrated and functionally operating system; warranted to perform the intended functions as herein specified.
3. The Instrumentation and Control System Integrator shall provide or supply all hardware and software specified herein or required and provides all required and specified collateral services in connection with the system such as testing, calibration, start-up, operation and maintenance manuals, and operator training without additional cost to the Owner.
4. The Instrumentation and Control System Integrator shall have been fully engaged in the business of installing SCADA systems for the municipal water and wastewater market for a period of at least five (5) years.
5. The Instrumentation and Control System Integrator shall have in his employment full time employees who are fully trained and qualified

engineers specializing in the areas of project management, project engineering, electrical design, radio telemetry system design, PLC programming, applications software development for SCADA software (In Touch by Wonder ware), mechanical design, and field service engineering. The integrator shall be a "Certified Wonder ware System Integrator".

6. The following Instrumentation and Control System Integrators have been pre-approved to participate on this project.
 - a. M/R Systems, Inc. of Norcross, Georgia
 - b. Turbitrol Company
 7. Other Instrumentation and Control System Integrators who desire to participate in the bid of this project shall be required to submit pre-qualification packages prior to the bid as described below.
- C. Pre-qualification Requirements for Non-pre-approved Instrumentation and Control System Integrators
1. Instrumentation and Control System Integrators who are not pre-approved are required to submit pre-qualification packages to the Owner/Engineer not less than fifteen (15) days prior to the bid date. Within five (5) working days of receipt, the Owner/Engineer shall notify the prospective Instrumentation and Control System Integrator of his approval or disapproval, and will issue an addendum naming all additional Instrumentation and Control System Integrators approved to offer quotations.
 2. As a minimum, each pre-qualification package shall contain the following specific information:
 - a. A text description of the SCADA system design philosophy and functionality. It is the intent of this specification that the SCADA system shall be a truly "open architecture" design using off-the-shelf components and non-proprietary communications protocols.
 - b. Company Organization Chart
 - c. Detailed description of the Project Team that the perspective System Integrator will apply to this project. Resumes of all members of the project Team, detailing education and experience on similar Municipal Water and Waste Water Telemetry Projects
 - d. Provide audited financial statements for the previous fiscal year and un-audited financial statements for the current fiscal year (year-to-date).
 - e. A complete reference list of all projects, over \$50,000.00 in value executed over the past 7 years.
 - f. A detailed reference list, including name, address, and telephone number for at least ten (10) users for whom the prospective

Instrumentation and Control System Integrator has installed similar systems over the past five (5) years. For each reference project provide a project profile including the following:

1. A system description for the project
 2. Contract size, contract duration, and actual duration
 3. Name, address, and telephone number of the consulting engineer for the project.
 4. Name, address, and telephone number of the Owner's contact familiar with the work.
 5. System Block Diagram
 6. Five (5) Color Graphic Displays, Screen Prints from the project
 7. Brand and Model number of the Open Architecture PLC used for the project.
 8. HMI Application Software used on the project.
 9. Number of Operator Workstations and Remote Workstations
 10. Methodology for transmitting data to Remote Workstations
 11. Number of Remote Sites communicating over 900 MHz Radio
 12. Brand of 900 MHz Radios utilized
- g. Number of Municipal Water and Wastewater projects over the past five (5) implemented with Wonderware InTouch. Provide project name for each.
- h. Number of Municipal Water and Wastewater projects over the past five (5) using Modicon PLCs for Remote Telemetry Units communicating via Radio. Provide project name for each.
- i. A detailed reference list, including name, address, and telephone number for at least three (3) users for whom the prospective Instrumentation and Control System Integrator has provided Radio Propagation Analysis and Frequency Licensing Coordination for over the last five (5) years.. For each reference project provide a project profile including the following:
1. Number of Remotes Sites tested
 2. Sites should be subtotaled for Tanks, Booster Pumping Stations and Sewage Lift Stations
 2. Radio Frequency Used
 3. Brand of Radio Used
 4. Examples of Paper Propagation Path Analyses performed.
 5. Examples of the On-Site Radio Survey analyses and data supplied to the customer as a result of the survey
 6. List of equipment that your firm has available performing Radio Survey.
 7. Name, address, and telephone number of the consulting engineer for the project.
 8. Name, address, and telephone number of the Owner's contact familiar with the work.
 9. System Block Diagram

- j. Within the prequalification package the perspective System Integrators shall include, on a separate page of the Manufacturer's letterhead one of the following statements.
 - 1. "All materials, equipment and services to be supplied for this project, comply completely with all the Drawings and Specifications"
 - 2. "All materials, equipment and services to be supplied for this project, comply completely with all the Drawings and Specifications, except as follows"
- k. A statement from the prospective System Integrator that all Specifications and Drawings listed in this Request for Proposal have been received and reviewed.
- l. It shall be the Instrumentation and Control System Integrator's responsibility to provide sufficient data and information to allow the Owner/Engineer to promptly determine whether or not the equipment complies with the specifications. The failure to submit any of the above information will be sufficient grounds for disapproval.
- m. The final decision regarding which, if any, additional Instrumentation and Control System Integrators shall be pre-qualified to bid the project shall be made solely by the Owner/Engineer. All decisions made by the Owner/Engineer shall be final.
- n. Approval of a prospective Instrumentation and Control System Integrator does not waive the requirements for submittal and approval of shop drawings following contract award.

D. Technical Services:

- 1. The Instrumentation and Control System Integrator shall provide the following services during the course of this project:
 - a. Provide all project management and system design services required to insure a successful and fully functional SCADA system which meets the intended system functionality as described herein.
 - b. Prepare and submit detailed shop drawings as submittals for approval.
 - c. Develop and fully annotate all PLC programming.
 - d. Develop and fully document all applications software.
 - e. Provide the onsite supervisory services of a factory trained field service engineer to assist the General Contractor in the location of sleeves, methods of installing conduit and special cable, mounting, piping, and wiring of one of each type of service, and the methods of protecting all of the equipment prior to placing it into service.

- f. Provide the onsite services of a factory trained field service engineer to startup, calibrate, and place into service all instrumentation, radio equipment, PLC-based Remote Telemetry Units, telephone equipment, and other ancillary devices and equipment as required to achieve a fully operational and functional system.
- g. Provide the onsite services of a factory trained software engineer to startup the system and to work with the factory trained field service engineer to rigorously test the entire system. Results of all testing shall be documented in writing on a site by site basis.
- h. Provide the onsite services of a factory trained field service engineer to perform training of personnel in the area of troubleshooting the specific equipment supplied.
- i. Provide the onsite services of a factory trained software engineer to perform training of personnel in the area of the human-machine-interface (HMI) applications software as applied specifically to this system.
- j. Provide the onsite services of a factory trained field service engineer and factory trained software engineer to make repairs to the system during the one year warranty period.

1.2 PRODUCTS

1.2.01 GENERAL

- A. **Compatibility:** to assure the highest possible accuracy and complete compatibility. The CONTRACTOR shall provide all similar flow metering equipment from a single manufacturer.

- B. **Characteristics of Electromagnetic Meter:**

Description:

- 1. Electromagnetic flowmeter shall operate on electromagnetic induction principle and give an output signal directly proportional to the liquid rate of flow. The meter shall measure flow in the forward and reverse direction.
- 2. **Primary Flow Head**
The meter shall have a stainless steel metering tube and a non-conductive liner suitable for the metering for potable water. End connections shall be steel flanged for size 10", ANSI Class 300#, for meter size of 10" and AWWA Class B. The housing shall be epoxy coated steel, welded at all joints. Bolted coil enclosures shall not be acceptable.
- 3. The field coils of the meter shall be supplied with a precisely adjusted bi-polar direct current.
- 4. There shall be no electronic components on the primary flow head. Coil drive power shall be supplied by a remote signal converter. Output signal

from the primary shall be fed through 'DS' proprietary cable supplied with the meter to the signal converter.

5. The Primary Flow Head shall have a housing rated for:
 - a. Electrode material shall be compatible with the process fluid.
 - b. Liner material will be polyurethane.
 - c. The instrument shall be manufactured in an ISO 9001 approved facility.
 - d. When installed in lined piping, the meter shall be provided with corrosion resistant grounding rings. Grounding electrodes shall not be acceptable.
 - e. Meter calibration shall be performed by a direct volumetric comparison method. A calibration certificate shall accompany each meter. Calibration facility shall be certified to .03% accuracy, and be traceable to national standards.

1.2.02 BASIC MATERIALS

A. **Meter Body:**

Measuring tube shall be stainless steel 1.4301 (AISI 304).

Electrodes AISI 316 L

Housing steel SAE 1008, paint finish

Grounding rings stainless steel 1.4435 (AISI 316)

Terminal box die cast aluminum

- B. **Instrumentation:** The electromagnetic meter manufacturer must provide documentation that the electromagnetic field produced at the minimum expected flow rate will be acceptable for use with the specified signal converter transmitter which is furnished and installed as specified in section 17100 -2.6. The flow transmitter shall be installed in accordance with the installation details. The transmitter shall be connected to the primary head terminal box by as recommended by the manufacturer.

C. **Manufacturers:**

1. Krohne Model ENVIROMAG series
2. ABB
3. Approved equivalent

1.3.0 EXECUTION

- A. All electromagnetic meter and appurtenant work shall be installed in strict accordance with the manufacturer's printed instructions.

END OF SECTION FOR PART (I)

PART (II) - REMOTE TELEMETRY SYSTEM:**2.1 GENERAL**

- A. A new PLC based Telemetry Unit shall be supplied to monitor and control the various signals at the Flow metering and Control site. The Control System shall be comprised of a PLC-based Remote Telemetry Unit, (RTU), communicating to a Repeater Site, at Riverside Drive, via spread spectrum Radio. The repeater site will relay the monitoring and control information to the Central Telemetry Unit located at the Atlanta-Fulton County Water Treatment Plant via Modbus protocol. The existing Repeater Site and Central Telemetry Unit shall be reprogrammed to include the new Telemetry Unit.
- B. All equipment and materials shall be new, unused and proved by previous use of similar products to be completely suitable for the service intended.
- C. All of the equipment shall be the manufacturer's latest and proven design. Specifications and drawings call attention to certain features but do not purport to cover all details entering into the design of the SCADA system.
- D. All electrical components of the system shall be powered by 120 volt, single phase, 60 cycle alternating current, except as otherwise indicated or specified.
- E. All contacts for control, remote motor operated, or electrically operated equipment shall be rated not less than 10 amperes on 120 VAC unless otherwise specified herein.
- F. All systems and individual components, whether panel or field mounted units, shall be protected from voltage and/or current surges which may originate as a result of lightning or other external causes.
 - 1. Protective equipment to be provided by the System supplier and installed in accordance with his recommendations.
 - 2. Schematics of the instruments submitted for approval to the Engineer shall indicate how this protection will be provided and identify the items of equipment, which shall be used for this purpose.
- G. The Instrumentation and Control System Supplier shall supply "as-built" drawings containing all necessary information for proper maintenance and operation of the system.
 - 1. Wire log table showing connections (wire terminations) between all furnished components to be supplied to facilitate field wiring.
 - 2. Interconnection information between system components and equipment found in other sections of these Specifications shall be complete with all necessary interconnection information.
 - 3. Notes which refer to equipment manufacturer's drawings for proper interconnection will not be acceptable.
 - 4. Provide within 30 days after startup and after any field modifications.

- H. The PLC based monitoring and Control system including RTU, Flow Elements, Flow and Pressure Transmitters and On-Site Services shall be supplied by a single manufacturer to ensure the compatibility and functioning of the system.

2.2 PLC- BASED REMOTE TELEMETRY UNITS (RTUS)

A. General

1. A PLC-based Remote Telemetry Unit, (RTU) shall be supplied to communicate to the PLC-Based Central Telemetry Unit, (CTU) through the Repeater Site. All information shall be available via Hardwire or over the Modbus Radio Link.
2. Remote Telemetry Unit shall be constructed using "off-the-shelf programmable logic controllers, (PLCs), with modems, surge arrestors, relays, power supplies, and enclosures as required for a fully functioning and fully operational system.
3. All field wiring terminations shall be made to terminal strips capable of accommodating up to # 12 AWG wire. Terminal strips shall be mounted using DIN rails. Terminal strips shall be as manufactured by Phoenix Contact, Allen-Bradley, Square D or equal. Printed labels shall be used to designate terminal numbers for each terminal.
4. A fluorescent light (18" minimum) shall be mounted in the top of each RTU enclosure.
5. A limit switch shall be mounted on the door of the RTU enclosure. The limit switch shall be wired to a non-relay isolated input of the RTU to provide a "RTU Door Open" signal.
6. The PLC shall be programmed by the RTU supplier to maintain all equipment run-times, analog signal hourly averages, minimums, and maximums, and other data in memory for hourly upload to the SCADA system.
7. The programmable logic controller (PLC) for the RTU shall be a Momentum to match the existing Telemetry System as manufactured by Modicon.

B. Programmable Logic Controllers

Programmable logic controllers (PLCs) supplied for the following locations shall be Modicon PLCs as specified below:

1. Flow Metering and Control Site

Type	Description
Processor	Momentum M1 Processor Adapter, 256K RAM, 12K User Logic, 4K Registers, One Modbus RS232 port and one I/OBus port
Option Adapter	Momentum Option Adapter, Modbus (RS232/485) Port, TOD Clock, Battery Backup

Communication Adapter for Base #2 & Cable	Interbus (I/O bus) Adapter Interbus (I/O Bus) Cable 11cm long - Low Profile
Base #1	16 Digital Inputs, 16 Wired
Base #2	16 Digital Outputs, 2 Wired 8 Single Ended 4-20 mA, 2 Wired

C. PLC Enclosure Construction

1. All RTU components shall be housed in a single enclosure suitable for wall or floor mounting as shown on the contract drawings.
2. The RTU enclosure shall be constructed to meet or exceed the NEMA 4X rating. Access doors shall be padlockable and have continuous stainless steel hinges and approved latching. Provide internal bracing as required for rigidity. Heat load calculations shall be performed by the System Integrator to insure that the enclosure is properly sized to allow adequate cooling. NEMA 4X enclosures shall be constructed of 304 Stainless Steel.
3. Anti-corrosion inhibitor blocks shall be mounted inside each RTU enclosure to reduce corrosion. Corrosion inhibitors shall be Hoffnran Model A- HCl10E or equal as approved by the engineer.

D. Power Supply Distribution And Power Surge Protection

1. A Square D Model SDSA1175 with panel mounting bracket or equivalent AC power surge protector shall be installed integral to the RTU to provide transient and surge protection for incoming AC power to a simplex receptacle which shall be dedicated to power the uninterruptible power supply (UPS) system and to a GFI utility (convenience) outlet. Stainless steel cover plates shall be supplied for the simplex receptacle and the GFI utility outlet. All DC power supplies, modems, and all other RTU components shall be powered by the UPS system.
2. A Liebert (500VA, 350 Watts, 120 VAC) Uninterruptible Power Supply shall be provided integral to each RTU enclosure.. The UPS system shall be protected from AC power surges by the AC power surge protector described above.
3. Separate DC power supplies shall be provided for the PLC and for field analog and digital inputs. All DC power supplies shall be protected via properly selected 3AG size fast acting fuses mounted in indicating fuse holders. Indicating fuse holders shall be DIN rail mounted. If a radio is installed in the RTU enclosure a separate DC power supply shall be provided to power the radio. The radio power supply shall also be protected via a properly selected 3AG size fast acting fuse mounted in and indicating fuse holder.
4. Two (2) circuit breakers shall be provided integral to the RTU/CTU. One circuit breaker shall receive power from the UPS system and shall provide protection to the RTU internal power supplies and other components. The second circuit breaker shall be powered directly from

the AC power surge protector and shall provide protection to a Ground Fault Interrupt (GFI) duplex convenience utility outlet.

E. Input/Output (I/O) Requirements Remote Telemetry Unit

1. As a minimum, each PLC- based Remote Telemetry Unit (RTU) shall be supplied with the following minimum I/O complement:
 - a. 16 Digital (discrete) Inputs
 - b. 8 Digital (discrete) Outputs
 - c. 4 Analog Inputs (4- 20 mA or 1- 5 VDC)
2. All analog inputs, including spare analog inputs, shall be protected from surges using three stage surge/transient suppression devices. The first level of protection shall be via a 1/ 4 Amp 3AG size fast acting fuse. Secondary and tertiary protection shall be fulfilled using a combination of three terminal gas discharge tube and metallic oxide varistor (MOV) surge protection with current limiting resistors. Terminals shall be installed adjacent to the analog surge protection devices to provide convenient access to 24 VDC for connections of future 2-wire transmitters. Additional terminals or jumpers shall be installed to allow each of the four analog inputs to be configured to produce one 4 to 20 mA or 1 to 5 VDC signal to the PLC plus one auxiliary output signal connected to terminals to drive an additional or future digital display or signal conversion device. Provide analog surge suppressors for inputs.
3. All digital inputs, including spare digital inputs, shall be isolated via electro-mechanical relays. Minimum contact rating for relays shall be 10 Amps at 250 VAC. Digital inputs isolation relays shall be connected to field wiring via DIN rail mounted terminal strips. A 2 Amp 3AG size fuse installed in an indicating fuse holder shall protect the 24 VDC power supply for all digital inputs. A minimum of twelve (12) relays shall be provided and shall be fully wired to twelve (12) of the sixteen (16) available digital inputs. Additional digital inputs shall be wired via interposing relays if required to accommodate additional digital field input signals.
4. Digital Input #14 shall be dedicated to monitor AC power failure for the RTU.
5. Digital Input # 15 shall be dedicated to monitor Low Battery power condition of the uninterruptible power supply (UPS) system.
6. Digital Input # 16 shall be dedicated to monitor the limit switch mounted on the door of the RTU enclosure.
7. Digital outputs shall be isolated from field wiring through terminal strips and electro- mechanical relays with minimum contact ratings of 10 Amps at 250 VAC. A minimum of six (6) relays shall be provided and shall be fully wired to six (6) of the available digital outputs. Additional outputs shall be wired via interposing relay if required to accommodate additional digital field output signals.
8. Analog Input: 4-20 mA

- a. Atlanta Flow
 - b. Fulton County Flow
 - c. Pressure
 - d. Valve position
- 9. Analog Outputs: 4-20 mA
 - a. None Required
- 10. Digital Inputs
 - a. Local /Remote Status
 - b. AC Power Failure
 - c. High Water Level
 - d. RTU Intrusion
 - e. Low Battery Power
- 11. Digital Outputs
 - a. Valve failure
- 12. Derived Signals
 - a. Daily Flow Total
 - b. Previous Days Flow Total
 - c. Continuous Flow Total
 - d. Average Daily Flow
 - e. Previous Days Average Daily Flow
 - f. Maximum Daily Flow
 - g. Previous Days Maximum Daily Flow
 - h. Minimum Daily Flow
 - i. Previous Days Minimum Daily Flow

F. Communications Protocol

- 1. In order to insure compatibility with the current telemetry system and future expandability, all communications shall be via Modbus. No other protocol shall be acceptable.

G. Radio Communications Subsystem

- 1. Provide conduits, coaxial cables, outlets, remote terminal units, antennas, and other items as indicated and/or required for a complete and functioning system to interface with the existing repeater and control station. Each RTU shall contain an integral radio transceiver unit which shall operate in the 900 to 960 MHz MAS frequency band. The unit shall be capable of operation in either point-to-point or point-to-multipoint environments.
- 2. Radio transceivers shall be MDS 9710 Transceiver as manufactured by Microwave Data Systems.
- 3. Remote radio transceivers shall communicate via a directional 10 dB gain Yagi Antenna installed at the location as shown on the drawings. The antenna shall be installed at the elevation and orientation as determined by the instrumentation and control system integrator. The

remote directional antenna shall operate over a frequency range of 900 to 960 MHz.

4. Supply Polyphaser IS-50NX-C2 RF surge protector as lightning protection.
5. Provide mounting hardware including weatherproof clamp suitable for direct mount to 2 inch, Schedule 40 steel pipe. The remote directional antenna shall incorporate a Type N, female connector on a 18" minimum pig-tail.
6. Provide Andrew Model # 204989-1 Grounding Strap Kit for 1/2" cable.
7. Provide Andrew Model # 43211 Hanger Kit for 1/2" Cable, 10 hangers minimum.
8. The transmission cable connecting the radio transceiver with the antenna shall be low-loss foam-dielectric type. The cable shall be Andrew's 2 inch LDF for distances from 0 to 70 feet, 7/8 inch LDF for distances from 70-250 feet and 1-1/4 inch LDF for distances greater than 250 feet.
9. A 3-foot section of "superflexible" transmission cable between the radio transceiver antenna port and the telemetry panel bulkhead connector. Connectors shall be standard Type N connectors for connection to a continuous piece of cable extending to the antenna. The communication cable shall be weatherproof transmission cable suitable for direct environmental exposure. "O" ring seals shall be used on all connectors.
10. The Instrumentation and Control System Integrator shall assist the Owner in gaining a FCC license. The Instrumentation and Control System Integrator shall prepare Frequency Coordination paperwork and FCC Licensing paperwork. The Owner shall sign such documents and shall forward them to the proper addresses.

H. Antenna Mounting Towers & Masts

For the various locations, the system integrator shall supply and install antenna Poles and/or Mast. All Masts shall be aluminum or stainless steel in construction.

I. Radio Survey and Frequency Coordination

The System Integrator shall perform a radio survey using GPS location and computer propagation analysis software.

J. On-Site Radio Survey

The manufacturer shall provide, in submittal form, a Radio Survey for each of the system being supplied. The Owner will provide the manufacturer with the exact coordinates and elevation of each station as well as those of the repeater site. The RTU paths shall be designed for a calculated operating margin to provide as expected 20 db quieting in the radio receiver 99.9% of the time.

The successful System Integrator shall perform an On-Site Radio Propagation Study to verify Radio Paths before supply hardware or Final Licensing.

2.3 PROGRAMMABLE CONTROLLER

A. General Hardware Description:

The Contractor shall furnish and install the control system in accordance with the Performance Criteria Section of this specification and as detailed on the applicable Contract Drawings.

The PLC shall collect data, process control functions, communicate with other PLCs, and distribute process information along the local area network.

The PLC shall be able to have its program downloaded from a remote workstation over the local area network, and be locally programmed from a portable laptop computer.

The executive firmware of all intelligent modules shall be stored in Flash memory and shall be able to be updated in the field using standard programming tools. Executive firmware files shall be readily available via a public web site.

The PLC shall have provisions for communicating unsolicited messages (report by exception) to an operator interface to reduce network traffic.

B. PLC Requirements

Each PLC shall include but not to be limited to:

1. A processor module (CPU)
2. Power supply
3. I/O modules as required
4. Communications modules as required
5. Connectors and cables as required

The PLC shall be modular allowing for the system to be tailored to meet the needs of the application.

The PLC shall be field expandable to allow for the expansion of the system by the simple addition and configuration of hardware.

All wiring shall be neatly installed and wire ways shall be used wherever possible. All wiring shall be identified at both ends by wire markers.

Each module shall include a clearly visible faceplate with appropriate data such as the manufacturer's model number and a brief description of the module's function.

The I/O modules shall be capable of being DIN rail mounted. In addition, it shall be possible to secure each module to the panel backplane.

All components of the PLC shall be designed to provide for free airflow convection cooling without the need for internal fans or other means of cooling except heat sinks.

The PLC system shall be furnished by a single vendor who has been actively manufacturing programmable logic controllers of the required specified capabilities and whose products have operated successfully for a period of at least eight years.

The PLC system manufacturer shall maintain, as part of a national network, engineering service facilities within 200 miles of the Project, to provide start-up service, emergency service calls, repair work, service contracts, maintenance, and training of Department personnel. Emergency service shall be available within twenty-four hours of notification.

The PLC shall be designed, manufactured and tested to the latest applicable NEMA, IEC, ANSI, and IEEE standards.

All PLC equipment shall be UL, CE, CSA listed.

C. General Hardware Technical Specifications:

All PLC equipment shall meet as a minimum the following electrical standards:

1. RFI Immunity (IEC 1000-4-3): 80 to 1000MHz, 10V/m
2. Ground Continuity (IEC 1000-4-5): 2kV shield to ground
3. Electrostatic Discharge (IEC 1000-4-2): 8kV air / 4kV contact

All PLC equipment shall meet as a minimum the following environmental specifications:

1. Operating Temperature: 0 to 60 degrees C (32 to 140 degrees F)
2. Humidity: 0 to 95% RH noncondensing @ 60 degrees C (140 degrees F)
3. Altitude: 2000 meters
4. Vibration: 10 to 57 Hz @ 0.075 mm d.a., 57 to 150 Hz @ 1 g
5. Shock: +/- 15 g peak, 11 ms, half-sine wave

Each PLC system shall be designed using a CPU mounted on a local I/O module to perform all the functions as outlined in this Section. If I/O modules beyond the capacity of the local I/O module are required, then they shall be connected as Remote I/O or Distributed I/O.

Remote I/O shall be connected to the PLC through an IOBus port on the CPU. The IOBus port shall support a minimum 500 Kbaud data rate to all remote I/O modules in each auxiliary panel.

D. Central Processing Unit (CPU):

The CPU shall read the inputs, perform all system logic, conduct on-line diagnostics, and control the outputs. Diagnostics shall include memory checks, communications monitoring, I/O bus monitoring, watchdog timing, and user program validation. Diagnostic information shall be accessible from the program, from programming software, or remotely from the HMI.

The CPU shall be capable of monitoring the health of the local I/O module as well as all remote and/or distributed I/O modules. A single bit shall show the active or inactive state of each module. This information shall be accessible from the program, from programming software, or remotely from the HMI.

The CPU shall provide program execution and support remote or local programming. The CPU shall provide I/O scanning and peer to peer inter-processor communication to other PLCs in the system and to peripheral support devices.

The CPU shall have light emitting diodes for the following conditions on its face to indicate health and status of the CPU:

1. Ready state
2. Run state
3. Serial port activity
4. Local area network status

The CPU shall have a 16-bit microprocessor with a minimum of 256 Kbytes battery backed RAM memory. Available memory shall be useable for program or data storage.

A minimum of 2048 discrete addresses and 4096 registers shall be available as battery backed RAM in the CPU.

The CPU shall be programmable using either traditional ladder logic or IEC 1131-3 compliant languages.

All addresses shall be documented with descriptors. Descriptor names shall match the database tag names used in the HMI.

The CPU shall permit changing program and data values while running without interrupting the process.

Data registers shall be stored in battery backed RAM. The battery shall be accessible from the front of the CPU. It shall be possible to change the battery while the CPU is running. The battery used shall be a pair of readily available AAA alkaline batteries.

The PLC shall include a battery backed integral real-time clock that can be accessed from the control program. The clock shall include registers for the time of day (year, month, day, hour, minute, second, and day of the week). The real-time clock shall be easily synchronized with an external device such as a PC or another PLC.

E. Input and Output Modules:

1. General

The I/O modules shall be capable of connecting directly to 2, 3, and 4 wire devices without the need for auxiliary terminal blocks.

All modules shall be enclosed in rugged plastic housings.

All modules shall conform to the IEC 1131 standard for EMC Noise Immunity with surge withstand capability of 500 volts, 12 Ohm for DC voltage I/O modules.

Input and output modules shall have labels, which shall be marked or labeled in accordance with the Contract Drawings.

All modules and connectors shall be keyed to safeguard against the insertion of a connector into the wrong module.

All I/O modules shall be firmly attached to the panel backplane.

All wiring to the I/O modules shall be to plug-in connectors that allow removal without the need to disconnect the wiring.

I/O module wiring connectors shall be capable of accommodating 1 #12 AWG or 2 #14 AWG wires.

External fuses shall be added as required per the manufacturer's documented recommendations.

All I/O modules shall have a visible LED to indicate that the operating voltage is present, the self-test has been passed, and the module is ready.

Provide one spare I/O minimum for each type used.

2. Discrete I/O

Discrete input modules shall be 24 VDC and have no more than 32 points per module.

Each point shall have a light emitting diode on the face of the module to indicate point status. Green shall indicate that the point is ON. Each LED shall align with its associated connector terminal.

Discrete inputs shall be optically isolated to protect bus circuits from transients and surges. The input-to-bus isolation shall be at least 1780 V rms for 1 minute.

Discrete output modules shall be 24 VDC or relay type and have no more than 32 points per module. Outputs shall be rated to at least 0.5A per point. External relays may be used as required to increase capacity.

Discrete outputs shall be optically isolated to protect bus circuits from transients and surges. The input-to-bus isolation shall be at least 1780 V rms for 1 minute.

Combined input/output modules shall be permitted in situations where it either reduces the total number of I/O modules required or provides an I/O type that is not otherwise available.

3. Analog I/O

The analog input modules shall accept as a minimum 10 V, 5 V, and 4 - 20 mA signal inputs from field mounted transmitters. The range for each input channel shall be independently configurable as part of the application program.

Analog input accuracy shall be a minimum 0.28 percent of full scale input span for 4-20 mA inputs, 0.27 percent of full scale input span for 10 VDC inputs and 0.21 percent of full scale input span for 5 VDC inputs, at 25 Degrees C.

Analog input channels shall be optically isolated to protect bus circuits from transients and surges. The channel-to-bus isolation shall be at least 500 VDC for 1 minute.

Analog input modules shall be isolated from channel-to-channel. The channel-to-channel isolation shall be at least 200VDC for 1 minute. External surge suppressors may be used as required.

Analog input modules shall have a minimum 15-bit resolution.

Analog input update time shall not exceed 1 ms plus 1.5 ms time the number of channels configured.

Analog output modules shall convert 12-data bits plus one-sign bit data words into proportional 4-20 mA or 10 VDC analog output signals. The range for each input channel shall be independently configurable as part of the application program.

Analog output accuracy shall be a minimum 0.40 percent of full scale output span for 4-20 mA outputs and 0.2 percent of full scale output span for 10 VDC outputs, at 25 Degrees C.

Analog output channels shall be optically isolated to protect bus circuits from transients and surges. The channel-to-bus isolation shall be at least 500 VDC for 1 minute.

Analog output channels shall be selectable on a point per point basis to either hold the last state, set to zero or set to full range upon reset or stop of the PLC application.

2.4 APPLICATIONS SOFTWARE DEVELOPMENT

- A. The existing Man-Machine Interface (MMI) software shall be fully configured by the System Integrator. Reports, graphics displays, real-time trends, historical trends, security, and alarming shall be developed by the System Integrator through a collaborative effort between the Engineer, Owner, and System Integrator. Graphics displays shall be designed by the System Integrator for each remotely monitored site. Graphics displays shall be fully colorized representations of the various facilities and shall be based upon plan and elevation representations of the facilities taken from the drawings provided by the Owner/Engineer.
- B. In general, the operator interface to the system shall be via a hierarchy of graphics screens with "poke points" which will allow operators to navigate the plant facility by facility by simply "clicking" on the poke points with a mouse pointing device.
 - 1. A "Main Menu" shall be developed and will contain "poke points" to allow navigation to the following major subsystems:
 - a. Flow Monitoring Station
 - b. Real-time trend displays.
 - c. Historical trend displays.
 - d. I/O diagnostics test displays.
 - e. Current alarms.

2. The "Main Menu" shall contain dynamic symbols to depict the operational/communications status of each PLC on the network (i.e. PLC Normal or PLC in Communications Failure).
 3. Each graphic display shall be designed so that an operator may "click" on "poke points" to gain access to any area of the plant, to the water distribution system, or to the Main Menu. The operator shall also be able to access the Current Alarms Display from any graphic display. Real-time and Historical Trend displays shall be made available from each plant process area via poke points.
 4. All graphics displays of distribution system facilities shall be drawn to represent actual site conditions and actual equipment and facility colors when possible. Drawings of the distribution system facilities shall be furnished to the System Integrator by the Owner.
 5. Special graphics displays shall be developed by the instrumentation and control system vendor for each process control strategy. These graphics displays shall allow authorized operators to modify control parameters such as set points, operational sequences, etc. Passwords shall be utilized to determine the authorization level of operators.
 6. All process alarms shall be categorized by "group" with each group representing a specific area of the plant or distribution system.
 7. Security of the system shall be accomplished via allowing access to various parts and features of the system via entry of User names and passwords.
 8. All historical process data, such as average flows, hourly minimums and maximums, etc., shall be maintained by the various programmable logic controllers; not by the MMI software package.
- C. For each I/O card of each PLC rack the instrumentation and control system vendor shall create a graphic display which depicts each I/O signal by tag and description. These displays shall be used for troubleshooting and for I/O testing.
- D. The System Integrator shall expand the existing Instrumentation and Control System. The graphics shall be developed so that the final application appears as one cohesive application, and not three, 3, separate applications. The System Integrator shall to provide a maintain standards for Graphic Development, Menuing, Alarming and Trending.
- E. Graphics Displays shall be High Resolution 3-D Renderings of the Remote Sites Imported into the Wonderware application, to provide the same look and feel of the existing Wonderware Graphic Display Screens.

2.5 GRAPHIC DISPLAY DESIGN MEETING AND SUBMITTALS

- A. A two-day graphic display design meeting shall be held with the Engineer and Owner's personnel to discuss specific details of overall design of the graphic displays including discussions of the particular signals which are to be displayed on each graphic display. The meeting shall be held at the instrumentation and control system vendor's facility.

- B. Prior to the meeting the instrumentation and control system vendor shall submit detailed sketches or screen shots of the proposed graphics displays to the Engineer for review.
- C. Travel and living costs to/from the instrumentation and control system vendor's facility shall be borne by the Owner/Engineer.

2.6 ELECTROMAGNETIC FLOW CONVERTER TRANSMITTER

- A. The magnetic inductive flow converter shall be remote mounted and provide precisely controlled and regulated, bi-polar DC primary field excitation pulses at a keyed frequency. It shall convert the primary flowmeter signal into a standard linear analog output directly proportional to the flow rate or flow total. The converter shall be capable of up to (4) inputs or outputs with selectable combinations of:

- Standard 4-20 mA DC output with selectable 3.5 mA or 22 mA levels on fault, with HART superimposed digital signal.
- Totalized pulses, with each pulse representing a fixed volume or mass.
- Frequency output of 0 – 10 kHz
- Control Input
- Alarm/Status Output

The full scale measuring range shall be a configurable input in all standard engineering units as well as any user defined unit, and freely adjustable over a range from 1.0 to 40 ft/sec velocity.

Converter shall be capable of continuously monitoring all common modes of failure of magnetic inductive flowmeter. The converter shall provide local display of detected errors, a measure of their severity, as well as the ability to assign any or all errors to outputs. All diagnostics shall be available on the standard HART communication protocol.

The converter shall be microprocessor based and be completely interchangeable with other converters of the same type. The converter housing shall contain an EEPROM memory, saving the original calibration data, factory default configuration settings, and (2) user defined configuration setting profiles even with loss of power. No auxiliary test meter or primary simulator shall be required for commissioning, zeroing, or interchanging of the flow converter.

The converter shall have two independent counters, which are assignable as Positive, Negative or Sum totals. Counters shall be password protect able to prevent unauthorized resetting. The counters shall maintain their accumulated values even with power loss, and continue counting when power resumes.

- B. Converter Specifics

Magnetic inductive flow converter shall contain the following features as standard equipment.

Application: Suitable for Forward/Reverse flow measurement capabilities, with no loss in performance.

Accuracy: Shall be minimum of +/- 0.15% of rate + 1mm/s

Repeatability: +/-0.06% of Rate

Hardware Requirements:

Mounting shall be remote, all utilizing the same electronics components. With Remote Wall: housing material of polyamide and polycarbonate. NEMA /4X rated (IP 65).

Display:

The converter shall be provided with local graphical display of flow rate, tantalization and diagnostics

User Interface:

Programming of the flow converter shall be accomplished without removing the glass cover via 4 optical keys or remotely with hand held HART terminal or with vendor and protocol independent PC configuration software; PACTware (**P**rocess **A**utomation **C**onfiguration **T**ool) over HART or other bus protocols. Manufacturer shall provide necessary drivers (DTM's) at no additional charge.

Inputs / Outputs:

- a. Analog outputs shall have user configurable time constant of 0 to 100 seconds.
User adjustable low flow cutoff to force readings to zero on decreasing flow and de-activate on increasing flow, settable from 0% to 20% of full scale setting, with the decreasing flow setting < increasing flow setting (providing hysteresis).
The converters basic input and output shall contain Six (6) I/O's;
Two (2) Analog mA output with HART Smart transposed on top
Two (2) Pulse or Analog Frequency output
Two (2) Status outputs.
- b. All inputs / outputs shall be galvanically isolated from each other and all other circuits. The converter shall offer as optional, modular input / output options to allow the use of any combination of 4-20mA.

Analog Outputs:

4-20mA can be assigned to represent the following measurement:

Flow Velocity,

The analog output shall be user configurable to allow custom ranges anywhere from 0 mA to 25 mA with selectable error levels (i.e. 22mA / 3.5mA). Error levels can be activated to indicate fault in device (F), application error (A) and (F), or uncertain measurements (U), (A), and (F).

Status Outputs can be assigned to represent;

Diagnostic errors: application error; uncertain flow measurement flow direction positive or negative, flow over range;

Control Inputs can be assigned to;

Set output A, C, or D to zero; set all outputs to zero; hold output A, C, or D at last value; hold all outputs at last value; external range change; reset diagnostic error messages; reset counter 1 or 2; or reset all counters.

Communication Protocols

The converter shall have HART smart protocol as standard, using the Frequency Shift Keying (FSK) technique to ride on top of the 4-20mA signal without affecting the analog output.

Commissioning / Testing Capabilities

The converter shall provide the ability to simulate flow rates, to verify analog output spans in receiving devices are correct. The converter shall self test for over load or open circuits on the analog output and alarm if either condition exists. The converter shall provide the capability to test all inputs and outputs for proper operation to assist in commissioning. The converter shall self test all variables that can affect magnetic inductive flowmeters performance, and verify all variables are within tolerance, and alarm when measurements are uncertain, without the use of additional test equipment. Ten year data retention during storage, without the need for auxiliary power. The flow converter shall be manufactured in an ISO 9001 approved facility and shall undergo 20 hours of environmental burn-in to detect defective components, prior to delivery. The converter shall incorporate the highest levels of Electro Magnetic / Radio Frequency Interference protection / suppression as well as overload protection for all input / output circuits and meet the requirements of the EU-EMC Directives and bear the CE Approval symbol.

The signal converter shall be KROHNE model OptiFlux IFC300, ABB or approved equivalent.

a. Electromagnetic flow converter Transmitter Schedule

Item	Tag	Description
1	FIT-101a	Fulton County System Flow
2	FIT-101b	City of Atlanta System Flow

2.7 PRESSURE TRANSMITTERS

- A. Direct connected diaphragm seal transmitter shall have a ½-inch NPTF connection to compensating side. The diaphragm seal shall have a welded diaphragm.
- B. Body bolts shall be of a corrosion resistant 316 stainless steel. All zero and span adjustments shall be non-interacting. Transmitter output shall be 4 to 20 mADC proportional to process variable. Transmitters shall be two (2) wire type powered from Contractor furnished remote control panel with 24 volt DC power, unless otherwise specified. The construction of the transmitters shall be such that failure of any pressure port will not permit entry of process fluid into wiring conduit and into the electronics. Transmitters shall be furnished fully compensated for ambient temperature changes. Total temperature effect shall be $\pm 0.5\%$ (combined zero and span) of span per 100° F, at maximum span. Zero elevation and suppression must be built in to the standard transmitter and be adjustable over a range equivalent to a minimum of 50% of calibrated span. Transmitter shall have integral transient surge protection.
- C. Load limitation should be a minimum of 500 ohms at 24 VDC power. All wiring connectors shall be with screw terminals, with integral test jacks for monitoring output signal. Transmitter shall be furnished with Junction Box. Electrical conduit connections shall be a minimum of ½-inch NPTF.
- D. Overall accuracy (includes combined effect of linearity, hysteresis, repeatability) shall be $\pm 0.1\%$ of span. Transmitters shall be as manufactured by Rosemount Model 3051 SMART Series or approved equal. The instrument shall be factory

calibrated for the range specified in the data sheets, and means shall be provided for "zeroing" and calibrating in the field.

E. Gauge Pressure Transmitter Schedule

Item	Tag	Description
1	PIT-100	System Pressure

Existing mosaic graphic panel modification located at the North Area Water Treatment Plant to include the installation of the following indicators. Indicators shall match existing graphic panel indicators.

1. FI-101A Fulton County emergency flow
2. FI-101B City of Atlanta emergency flow
3. PI-101A Emergency bypass pressure

2.8 TRAINING

A. System supplier to provide operation and maintenance training for Owner's personnel to ensure their adequate knowledge of use of the system.

B. Training to be conducted on-site by instructors thoroughly familiar with operation of the system, with training divided into three general areas as follows:

1. Analog and digital hardware maintenance training:
 - a. Instruct Owner's maintenance personnel in the proper preventative maintenance and repair tasks associated with system maintenance.
 - b. For analog instrumentation, include detailed instruction of calibration and checking along with familiarization training for basic repair and maintenance tasks that are expected to be encountered.
 - c. For computer hardware maintenance, include general familiarization with computer hardware and peripheral devices with instruction in preventative maintenance tasks associated primarily with peripheral devices. It is not intended that this course will produce trained computer maintenance technicians.
 - d. Include detailed instruction in maintenance and repair work associated with the computer process I/O sub-system.
 - e. Minimum training time for this material to be four (4) hours.
2. Operator familiarization training:
 - a. Instruct Owner's operating personnel in the proper use of the analog and digital process control system.
 - b. Include instruction in the system control steps and basic interface with the computer system.
 - c. Provide sufficient training to Owner's operating personnel so they can respond to the normal tasks required for operation of the plant.
 - d. Minimum training time for this material to be four (4) hours.
3. Supervisor and application software training:
 - a. Provide supervisory personnel with a working knowledge of all application software supplied.

- b. Include basic digital and computer concepts, process control concepts, database configuration, report configuration, graphic display configuration, and control strategy development.
- c. Minimum training time for this material to be eight (8) hours.

2.9 START-UP SERVICE

- A. Upon final completion of all components determine date of start-up jointly with Engineer, Owner and General Contractor.
- B. System supplier to be responsible for placing of SCADA equipment and systems in operation.
- C. System supplier to provide qualified personnel on the job site until successful operation of system is attained.

END OF SECTION FOR PART (II)

END OF SECTION

EXHIBITS

EXHIBIT A

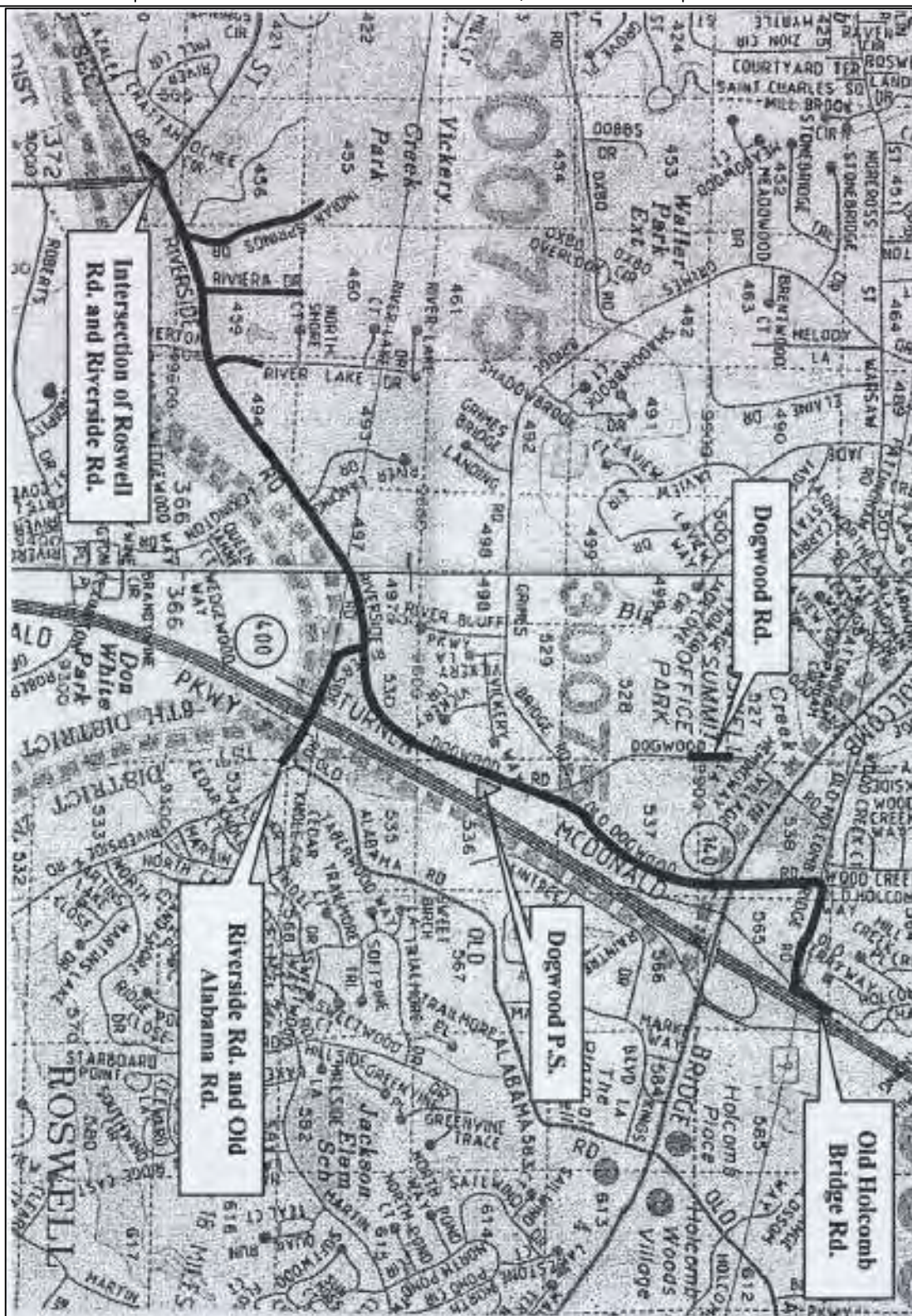
Location Map

EXHIBIT B

Project Drawings



FULTON CONSTRUCTION
MANAGEMENT PARTNERS



FULTON COUNTY
RIVERSIDE DOGWOOD WATER MAIN REPLACEMENT
LOCATION MAP

DATE: 11.01.06
SCALE: NTS
JOB #: W035
EXHIBIT: **A**